

# Recycling Technology Products

**An Overview of E-Waste  
Policy Issues**

July 2006



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U.S. Department of Commerce  
Technology Administration  
Office of Technology Policy

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## INTRODUCTION

Recycling of electronic products has become an issue for communities around the world as concerns over waste management issues have grown. As a result, lawmakers and policymakers have begun to turn their attention to addressing this vexing and multi-dimensional issue. The purpose of this report is to help educate and inform policymakers as they begin their consideration of an issue that affects the technology industry and its stakeholders, including manufacturers, retailers, recyclers, and consumers. The Technology Administration engaged on this issue because how our electronic waste solutions are developed, and who is involved in the decision process, will affect the business models and international competitiveness of U.S. companies.

This report provides an overview of stakeholder positions and concerns regarding the development and financing of a system for recycling used electronics. It provides background and analysis on some of the most commonly discussed financing models that could potentially be incorporated into an electronics recycling system. Attached to the report is a full addendum of activities, legislation, regulations, initiatives, stakeholder comments, and recycling models used by other industries that will provide greater depth on the details of developing and financing an electronics recycling system. This report does not seek to make recommendations or to determine whether a particular electronics recycling system is better than another. Instead, the report illustrates the various options under discussion, the range of stakeholder positions regarding those options, and the areas of consensus. By collecting a wide range of information into one comprehensive document, the report is designed to assist lawmakers and policymakers in engaging in an informed debate as they consider future action on a potential electronics recycling system.

Electronic products that are near or at the end of their useful life are referred to as “e-waste” or “e-scrap.” Several characteristics of e-waste—its bulky nature, the high cost of properly managing it, its potentially toxic constituents—distinguish electronics from ordinary trash. E-waste comprises one to three percent of municipal waste across the United States. It is a small but fast-growing portion.<sup>1</sup> The International Association of Electronics Recyclers projects that given growth and obsolescence rates of the various categories of consumer electronics, somewhere in the neighborhood of 3 billion units will be scrapped during the rest of this decade, or an average of about 400 million units a year.<sup>2</sup>

Some electronics also contain heavy metals. For example, there is a not insignificant amount of lead in TV and PC monitors, especially the older models—enough to cause most TV and PC cathode ray tubes (CRTs) to test hazardous under Federal hazardous waste criteria.<sup>3</sup>

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<sup>1</sup> EPA, Technology Administration (TA) Roundtable on Electronics Recycling, U.S. Department of Commerce, September 21, 2004.

<sup>2</sup> International Association of Electronics Recyclers, 2006.

<sup>3</sup> See Timothy G. Townsend, Stephen Musson, et al., *Characterization of Lead Leachability from Cathode Ray Tubes using the Toxicity Characteristic Leaching Procedure*, Florida Center for Solid and Hazardous Waste



There are approximately four to seven pounds of lead in older models of CRTs and around two to four pounds in newer models.<sup>4</sup>

Governments are working with industry manufacturers to manage resources in a trend referred to as “product stewardship.” Product stewardship is a product-centered approach to environmental protection. It calls on those in the product lifecycle—manufacturers, retailers, users, and disposers—to share responsibility for reducing the environmental impacts of products.<sup>5</sup> This responsibility spans the product's life cycle: from selection of raw materials to design and production processes to its use and disposal.<sup>6</sup> Product stewardship also embraces the concept that products have materials in them that have a value; and that value should be captured, preserved and returned for use in commerce. Governments are encouraging product stewardship in a number of industries, such as automobiles, packaging, and electronics.

Over 10 countries have legislation on discarded electronics and more are developing legislation. The Waste of Electrical and Electronic Equipment (WEEE) Directive in the European Union (EU) covers the collection and treatment of electronics, as well as large household appliances and medical devices. The Restriction of Hazardous Substances (RoHS) Directive in the EU bans the use of certain hazardous substances in electronic equipment. The EU Directives are having a significant effect on U.S. businesses. U.S. companies selling into the EU market must comply with the WEEE and RoHS Directives and most are changing their product line worldwide to meet the new requirements of RoHS. It affects not just electronics manufacturers that source globally, but retailers as well. For example, Walmart announced that all personal computers it sells in the United States would be RoHS compliant by July 2006.<sup>7</sup> Other countries, including Japan and China, have taken steps to echo some of these types of requirements within their borders.

In the United States, 408 bills related to waste management, recycling, and product stewardship were introduced in state legislatures in 2003, 50 more than in 2002. Ninety of these were related to mercury, usually limiting mercury in landfills; 70 were deposit- related

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Management, December 1999, <http://www.ees.ufl.edu/homepp/townsend/Research/CRT/CRTDec99.pdf>, (16 June 2006) and Timothy Townsend and Kevin Vann, *Research Update: Leaching of Hazardous Chemicals from Discarded Electronics*, National Electronic Equipment Management and Compliance Assistance Workshop, Atlanta, Georgia, September 23, 2002, [http://swix.ws/cd/EPA\\_DVR-ATL/content/pdf\\_atl/Vann.pdf](http://swix.ws/cd/EPA_DVR-ATL/content/pdf_atl/Vann.pdf) (16 June 2006).

<sup>4</sup> EPA 67 FR 40509, June 12, 2002. California Environmental Protection Agency *Managing Waste Cathode Ray Tubes*, Fact Sheet August 2001, [http://www.dtsc.ca.gov/HazardousWaste/CRTs/HWM\\_FS\\_CRT-EmergencyRegs.pdf](http://www.dtsc.ca.gov/HazardousWaste/CRTs/HWM_FS_CRT-EmergencyRegs.pdf), 22 January 2003. Letter written by Linda Moulton-Patterson, Chair of the California Integrated Waste Management Board, dated March 30, 2001, <http://r4.ucdavis.edu/services/crt/crt.htm>, 22 January 2003. Various industry sources.

<sup>5</sup> EPA, [epa.gov/epr](http://epa.gov/epr).

<sup>6</sup> Western Electronic Product Stewardship Initiative, Definition of product stewardship <http://www.recyclingadvocates.org/wepsi/index.htm>.

<sup>7</sup> Walmart press release, *Wal-Mart First to Retail Market with Notebook Computer that Restricts the Use of Hazardous Substances*, February 20, 2006, <http://www.walmartfacts.com/newsdesk/article.aspx?id=1714>, (May 26, 2006).

bills, many to expand existing deposits beyond beer and soft drinks to other beverages. Twenty-six states introduced 52 bills related to electronics disposal.<sup>8</sup> In 2004, there were more than 35 electronic scrap bills introduced in legislatures in 17 states<sup>9</sup> and in 2005 there were a total of 30 electronic recycling bills proposed in 23 states, with two more at the federal level.<sup>10</sup> Many state and local governments want to see manufacturer financed recycling programs for electronics because they feel they are unable to add additional fees to their solid waste programs to provide government-supported programs.”<sup>11</sup>

Five states have banned the disposal of CRTs in landfills: California, Maine, Massachusetts, Minnesota, and New Hampshire. Four states—California, Maine, Maryland, and Washington—have passed statewide electronics recycling laws, yet with very different requirements for manufacturers and retailers. California has imposed a fee on the consumer at the time of purchase (called an “Advanced Recycling Fee” or ARF) to finance the recycling. Maine and Washington passed legislation that requires the manufacturers to finance the recycling. Maryland’s legislation puts the responsibility for financing the recycling on the government and the manufacturers. Other states have commissioned study committees to draft legislation on electronics recycling.

The cost of compliance for industry with any one law can be challenging. But industry is now facing a patchwork of international and state laws that can dramatically affect the manufacture, marketing, and business models of the U.S. electronics sector and the transaction costs and business models of our retail sector. Disparate requirements can lead to uncertainties, inefficiencies and high compliance costs that could impede U.S. industry’s ability to compete and innovate.

In 2001, the Environmental Protection Agency (EPA) convened a dialogue among industry, state and local governments, recyclers, environmental organizations, and others to find a single national solution to maximize the collection, reuse, and recycling of used electronics including a viable financing mechanism. The dialogue, called the National Electronics Product Stewardship Initiative (NEPSI)<sup>12</sup>, initially focused on a voluntary industry response to help increase recycling of used electronics, notably used TVs and PCs from household sources. (NEPSI, and this report, have dealt only with residential—as opposed to commercial—electronics recycling for which the management costs fall largely on taxpayers

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<sup>8</sup> *Recycling Today, NRC Convention: Debating Recycling at the State and Federal Level*, Sept. 18, 2003.

<sup>9</sup> Raymond Communications, *Status of U.S. Electronics Waste Legislation*, May 12, 2004.

<sup>10</sup> E-scraper News, October 2005.

<sup>11</sup> Oregon Department of Environmental Quality Federal Register comments in Appendix VII.

<sup>12</sup> This dialogue was initiated and funded by EPA. It was convened and facilitated by the University of Tennessee. Initially, the dialogue explored the possibility of whether voluntary programs could provide a solution. As the dialogue evolved to the point where the stakeholders were seriously considering a joint effort to lobby for Federal legislation, EPA withdrew its participation and funding out of concern that its continued involvement would raise questions related to anti-lobbying restrictions applicable to EPA staff and EPA grantees.

and local government.<sup>13</sup> Disposal of solid and hazardous waste by large businesses and organizations is controlled under the Resource Conservation and Recovery Act (RCRA), enacted by Congress in 1976; the Act exempts residential waste. Over time, the NEPSI participants realized that a national law might be necessary to force otherwise reluctant players to do their part to make a national system work. NEPSI reached consensus among its multiple stakeholders on many issues, such as the scope of industry products that would be covered, but the dialogue was brought to a close when participants could not reach consensus on a financing system. In 2004, NEPSI issued a compromise resolution and agreed to reconvene after industry reached agreement on the financing method. As of the writing of this report, consensus has not yet been reached. State and local government officials participated in NEPSI, and an early consensus among stakeholders might have forestalled the prospect of differing laws and regulations across the country.

The Office of Technology Policy (OTP) of the Technology Administration held a Roundtable on electronics recycling on September 21, 2004, to examine some of the major issues outstanding between stakeholders: most particularly the financing issues. The Technology Administration then solicited comments from the public in the Federal Register on October 20, 2004. This report is an outgrowth of OTP's Roundtable. It includes views expressed by the panelists from the Roundtable and comments submitted by organizations in response to the Federal Register notice (hereafter referred to as "commentors") requesting comments on: which products should be included in an electronics recycling program; methods for collection, transportation and recycling; financing a recycling program; and the role of the government in a recycling program.

The authors reviewed reports by government, industry, and nonprofit organizations and interviewed stakeholders at conferences and by phone. The Office of Solid Waste, EPA, provided substantial assistance during the research phase and subsequent review of the report. Research for the initial report was conducted between October and December 2004. It was peer-reviewed by three experts outside of the federal government and by the Office of Solid Waste, EPA, between January and April 2005. Some sections of the report were updated in 2006.

Chapter I of the report summarizes stakeholders' comments on the criteria for a national system of electronics recycling. Chapter II explains the different components of an electronic recycling system and describes the many different financing models under discussion in the United States or in use around the world. Page 16 provides an easy reference for the terminology used in discussing electronic recycling financing systems.

Appendix 1 describes multilateral treaties, activities, and laws in other countries that are affecting the inputs to electronic products and the treatment of electronic waste worldwide, as well as analyses of other countries' experiences establishing and financing national

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<sup>13</sup> The cost of recycling unwanted electronics from commercial and institutional sources is borne directly by those organizations which, generally, are required to meet Federal hazardous waste management requirements if they dispose of large quantities of electronics that meet the test for hazardous waste. Electronics from household and small quantity generators, by contrast, are exempt from hazardous waste management requirements.

electronics recycling programs. Appendix II describes the federal government legislation that governs waste disposal in the United States and recent legislation introduced in Congress relating to electronics recycling. The effort by federal, state, and local governments and industry and nonprofits to voluntarily come to a consensus on a national system of electronics recycling under the NEPSI process is explained in Appendix III, as is a description of the 12 models of financing stakeholders considered. Other government and industry initiatives, many of which grew out of the NEPSI process, are depicted in Appendix IV. In Appendix V, major state legislation on electronics recycling is described, as well as examples of proposed legislation to give the reader an idea of the range of proposals in state legislatures over the last few years. Also included are remarks by Assistant Secretary Ben Wu to the National Conference of State Legislatures summarizing the findings of this report. Illustrative examples from eight other industries—such as carpet, beverage container, and paint—that have established or have tried to establish recycling programs are analyzed in Appendix VI. There is a list of acronyms for easy reference in Appendix VII. Finally, Appendix VIII has reproductions of all the public comments received in response to the Technology Administration’s October 20, 2004, Federal Register Notice.

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## **CHAPTER I**

### **NATIONAL SYSTEM OF ELECTRONICS RECYCLING**

#### **Stakeholders' Criteria For A National System**

The Executive Branch has not taken a position on a particular financing system, on Federal legislation for a national system for electronics recycling, or on the need for Federal legislation, so this report does not take a position on one solution over another, but is merely reporting the views of commentators and stakeholders.

There are several areas in which many or most stakeholders have been able to reach agreement. Representatives of industry, retailers, recyclers and environmental organizations that participated in the Office of Technology Policy Roundtable on technology recycling and the NEPSI stakeholders all agreed on product stewardship as a goal. The Roundtable participants, the NEPSI stakeholders, and the majority of commentators that addressed the subject agreed on one other important issue regarding electronics recycling: a uniform national system of electronics recycling is preferable to a piecemeal state-by-state system. Many of the Roundtable participants and Federal Register commentators had been involved in the NEPSI process and reiterated their support for the compromises reached in that process or or their willingness to abide by those compromises in order to achieve consensus. NEPSI stakeholders had reached consensus on a number of critical issues including the scope of products, environmentally sound management procedures, market development opportunities, a base-level of infrastructure, and outlines of a third-party organization. Stakeholders' comments demonstrated that they want a system that is effective, efficient, enforceable, environmentally friendly, and adequately financed, with equal treatment and equal responsibilities for producers in the marketplace.

Despite these agreements, there is not yet consensus among stakeholders over how to achieve a national system of electronics recycling: whether it should be voluntary, pursued through state legislation, or through Federal legislation. Some stakeholders believe a national system could be realized through state legislation, with no need for Federal legislation, if the states all passed the same laws. States, however, have not passed the same, similar or complementary laws. The stakeholders are polarized, and the state legislation that has passed and the bills that are being drafted are varied and conflicting. As of May 2006, four states had passed e-waste financing legislation with dramatically different approaches. It can be expected that as more states act, differences may proliferate, thus increasing uncertainties, inefficiencies, and high compliance costs for industry.

Some stakeholders recognize “the inefficiencies inherent in a patchwork of state legislation addressing these issues,” but believe the Federal Government’s role should be limited to “encouraging electronics manufacturers to have comprehensive product recovery plans that

make state legislation unnecessary.”<sup>14</sup> The recycling industry stopped short of endorsing federal legislation, instead endorsing “a uniform national approach to establishing a system for the collection and recycling of obsolete electronics” in order to create an infrastructure with adequate incentives for effective and efficient solutions.<sup>15</sup> According to the International Association of Electronics Recyclers’ comments, tracking and maintaining a current understanding of different legislation and regulations at the state level will increase the liability and costs of electronics recyclers.

Other stakeholders support Federal legislation to pre-empt state legislation in order to create a uniform system across the country. One company’s comments capture the reasoning of a number of organizations: “...given the large number of stakeholders involved in this issue and their competing interests and priorities, today there is no agreement among all involved parties on the details for implementation of a voluntary recycling solution. As a result, legislation may be required to establish an improved electronic product recycling system.”<sup>16</sup> This company said that to avoid different state-by-state product recycling systems throughout the United States, it would support efforts to develop national legislation on this issue. The Electronic Industries Alliance (EIA) stated that it also believes Federal legislation is necessary to implement a national program in order to provide industry and other stakeholders with a level playing field.

The Retail Industry Leaders Association (RILA) said its members prefer “a national solution in order to avoid confusion from state to state. Any Federal program must pre-empt existing state and local recycling laws. If State electronic recycling programs are developed, they should be done on a statewide basis, pre-empting all county and local government recycling programs. Where the recycling program includes retail involvement at the point-of-sale, one plan for all retailers and manufacturers would be the most fair and appropriate. RILA continues that “Retailers that operate via internet, catalog and all other non walk-in retailers must not be treated any differently than traditional ‘brick and mortar’ retailers and must be required to collect the same ARF [advance recovery fee].”

In terms of what commentors stated should be included in Federal legislation, some were specific, such as the Oregon Department of Environmental Quality that recommended that Federal legislation “be passed to establish the basic elements of the system including product scope, financing mechanism and initial amount of financing needed, procedures to ensure manufacturer participation in the system, legal authority for independent organization managing the funds, and performance goals.” It also agreed with other commentors that, “The Federal Government should also be responsible for establishing environmentally sound management standards or guidelines for end-of-life management of electronics, measurement of performance goals, and enforcement of manufacturer participation in the financing system.”

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<sup>14</sup> Retail Industry Leaders Association’s comments in Appendix VII.

<sup>15</sup> International Association of Electronics Recyclers comments in Appendix VII.

<sup>16</sup> IBM comments in Appendix VII.



Below is a summary of the most common elements expressed by stakeholders as necessary components to a national system of electronics recycling. Not all stakeholders addressed or agreed with all of the points listed, but each had many supporters. For example, some argued for Federal Government legislation and some did not. Summarizing the most common points of agreement here, however, may help the reader gain a familiarity with the various elements under discussion by stakeholders as possible components of a national electronics recycling system. It should be noted that many stakeholders expressed the view that while they preferred one position over another—such as a certain financing system or a particular list of covered products—they would be willing to concur within a range of options in order to achieve consensus.

### **Product Coverage**

- Define covered products clearly to eliminate guesswork and lengthy negotiations between producers and retailers.

### **Collection**

- Set performance goals such as targets for percent or weight per capita for collection and recycling.
- Provide flexibility for local and regional solutions in collection methods, such as using collection incentive payments, not mandates or a centrally proscribed collection process.

### **Recycling**

- Treat residential and commercial electronics waste the same. Eliminate the small generator exception and ban the disposal of unprocessed covered electronic products and hazardous electronic waste in landfills and incinerators for commercial and residential waste.
- Change the treatment of e-waste under existing solid waste regulation so that electronics products can be reused and recycled properly without triggering “hazardous waste” regulations. Promulgate EPA’s proposed cathode ray tube (CRT) rule in final to address regulatory barriers and encourage states to implement these regulatory reforms.
- Set environmentally sound management guidelines for recycling and provide a system of auditing to ensure that dismantlers and recyclers are evaluated against these guidelines. (EPA has already issued such guidelines and tested them with the private sector under the EPA Plug-In to eCycling program. The guidelines are reproduced in the Appendix to this report. The next step is to establish an entity to certify organizations in compliance with the guidelines.)
- Provide sufficient resources to enforce the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) laws and any new electronics recycling laws and regulations.
- Control the export of hazardous electronic waste for disposal or for recycling to organizations and countries in compliance with U.S. treatment of the same materials.



Maintain the flexibility to find the best recycling solutions on an international level within the confines of environmentally sound management guidelines.

### **Financing**

- Agree on one financing mechanism to apply across the country. If the choice is an ARF, it should be applied nationwide. If the choice is producer responsibility, then the legislation should establish measurable collection and recycling rates and deadlines as well as reporting requirements to ensure an effective system.
- Establish procedures to oversee and enforce the system to ensure fairness and uniform participation, regardless of the financing system chosen. Many stakeholders expressed concern that if the government managed funds that were collected to finance a recycling system, the government could use the funds for other purposes. Thus, many stakeholders recommended using a third party organization (TPO), outside of the government, to manage the system.
- Build competition and market forces into the system from the beginning in order to keep costs low.

### **Minimizing Compliance Costs and Maximizing Participation**

- Standardize product labeling requirements, product literature requirements, information on packaging requirements, and reporting requirements so producers face only one set of requirements for compliance across the country.
- Include industry in the development of any design standards or material bans if they are part of any legislation.
- Ensure a level playing field for all manufacturers so there are no free riders. Regardless of which system commentators preferred, many mentioned the need for Federal legislation to ensure that all competing producers within a product category are mandated to participate and meet the same high standards for collecting and recycling or reusing their electronic products.
- Mandate that manufacturers who sell over the Internet and foreign manufacturers are full participants in the recycling program, including any collection and remittance of fees and responsibilities.

### **Incentives for a Market-driven Solution**

- Use the Federal Government's leverage as one of the country's largest information technology buyers to drive design improvements, manufacturer participation in recycling solutions, and end-of-life services. Increase use of Federal Government programs that Federal agencies can voluntarily choose to join, such as the Federal Electronics Challenge (FEC) and the Recycling Electronics and Asset Disposition (READ) contract.
- Develop incentives in the private sector for design for recycling (DfR) and design for environment changes (DfE) through programs that reward environmentally friendly design, such as Electronic Product Environmental Assessment Tool (EPEAT), Energy Star, DfE Program, and the Green Suppliers Network.

- Stimulate recycling and the market for recycled content and products using tax, procurement, or other incentives.
- Educate consumers about the importance of recycling and the opportunities for recycling.

## **Achieving a National System through State Legislation**

In the absence of national legislation, several states have enacted and many have considered legislation in e-recycling. On this issue the states are moving faster than the Federal Government to pass laws and promulgate regulations. Legislation by one state could effect a change nationwide without the enactment of federal legislation. For example, as part of its electronic recycling law, California has essentially imported the RoHS toxics elimination targets for electronics established in Europe. As a result, electronics sold into the California market must meet the same toxics elimination targets on the same deadlines as those products have to meet if they are sold into the EU market. The California law reinforces RoHS compliance on manufacturers that want to sell into the California, and by extension, the U.S. market. There has also been an effort by states to reach regional agreements on model legislation on electronics recycling. For example, the Council of State Governments/Eastern Regional Conference (CSG/ERC) developed model legislation.<sup>17</sup> Midwestern states have also joined in a regional initiative to develop a consistent and unified approach for managing waste electronics and model legislation.<sup>18</sup>

If a number of large states passed the same legislation, industry might be inclined to voluntarily form a nationwide recycling program. Mandated collection and processing of discarded electronics by several states, however, has not translated to change at a national level. The state laws have been diametrically divergent and the recycling industry, unlike electronics and automotive manufacturing, is highly dispersed and responsive primarily to localized markets. California, which implemented a fee on the consumer at the time of purchase to finance the recycling, has a system that was implemented statewide relatively quickly. Yet other states have not followed suit. Maine and Washington passed legislation that requires the manufacturers to finance the recycling. Maryland's legislation puts the responsibility on the government and the manufacturers. The model legislation developed by the CSG/ERC in 2005 and legislative principles endorsed by five Midwestern states in 2006 are based on producer responsibility.

Without legislation in a majority or all 50 states mandating uniform performance and consistent responsibilities of key stakeholders—particularly for retailers and manufacturers—there would still be problems with enforcement. Following are examples of several costs and difficulties associated with state-by-state legislation and reasons why some stakeholders argue that national legislation is needed.

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<sup>17</sup> See the Northeast Regional Electronics Management Project, <http://www.csgeast.org/enrgwaste.asp>.

<sup>18</sup> See the Minnesota Office of Environmental Assistance, <http://www.moea.state.mn.us/stewardship/electronicsmidwest.cfm>.

### *Differing Treatment of Hazardous Waste by States*

If individual states treat electronic scrap differently, then one state's regulations can be subverted by moving scrap to a neighboring state. The EPA sets minimum standards on the treatment of solid waste and hazardous waste by the states. CRTs disposed, as opposed to recycled, from large quantity generators (more than 220 pounds a month) such as commercial sources are considered hazardous waste, as are a few other consumer electronics. States, however, are free to pass more stringent standards than EPA's standards. Five states—Massachusetts, California, Maine, Minnesota, and New Hampshire—have passed more stringent standards: they have banned CRTs from all sources, not just large generators, from landfills. The California and Maine laws require environmentally sound management of the products sent for recycling, but both allow scrap to be shipped out of the state for recycling where they have no jurisdiction and cannot inspect the out of state facilities for compliance.

(Occasionally, the issue of interstate transportation of hazardous waste arises. But, government restrictions regarding the interstate commerce of hazardous waste are not allowed. The Dormant Commerce Clause Doctrine holds that no state can pass a law to restrict the interstate movement of goods, so no additional Federal legislation is required to ensure that hazardous waste can be transported from one state to another.)

### *Cost to the Local and State Governments*

Many state and local governments are pressed to find a financing mechanism for e-waste quickly because they cannot handle the cost of disposing of it themselves. For example, Rhode Island estimates its one landfill will be full by 2012. The City of Cambridge, Massachusetts, had to pay \$70,000 in 2003 to handle electronic waste. It cost Wooster, Massachusetts, \$150,000 to dispose of 120,000 lbs of e-waste.<sup>19</sup> Twenty-two of 32 states polled said that the economy had negatively impacted their recycling programs, with 13 states expecting cutbacks and 17 states expecting their budgets to remain level.<sup>20</sup> Local governments want relief and want other parties they deem primarily responsible—producers and consumers—to pay for recycling and associated costs.

### *Cost of Establishing One Recycling Financing Structure versus Fifty*

Snohomish County, which has created its own recycling program, said: "Most of this effort by Snohomish County, at great time and expense, would have been unnecessary if a smart front-end financed system were in place nationally. Few local governments can expend the effort we have. It is a great waste of public funds and resources for each local government and each state government to have to struggle with an issue that can most efficiently and effectively be addressed nationally." A national system could realize economies of scale in many areas, including the institutions and structure of a financing system for national recycling.

### *Cost of Industry Representation to State Legislatures*

As one commentor stated, "National manufacturers and retailers are already unable to provide knowledgeable representation and meaningful comment to state legislated study

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<sup>19</sup> Clean Water Action, E-Scrap Conference, October 18-10, 2004.

<sup>20</sup> NRC Convention: Debating Recycling at the State and Federal Level, *Recycling Today*, Sept. 18, 2003.

processes. It does not work to have hundreds of local governments and dozens of states trying to communicate with representatives of national manufacturers and retailers. At a local level, these communications are useless and ineffectual. The national government needs to address issues that involve national corporations.”<sup>21</sup> Industry stakeholders are expending considerable resources to follow, inform, and argue their views in the states that are considering legislation on electronics recycling; in early 2004 there were about 36 electronic scrap bills pending in legislatures in 17 states.

#### *Cost of Compliance to Industry*

Many legislative initiatives introduced in and/or passed in state legislatures to date define covered products differently, require different product labeling requirements, mandate varying information on packaging requirements, and have unique notification and reporting requirements to government and private entities, creating the potential for 50 different compliance regimes. Working with the states on the proposed legislation or even just following the different legislative proposals is resource intensive for industry. Different compliance regimes create confusion, uncertainty and costs for businesses.

For example, to comply with California’s new fee requirement, manufacturers are required to notify all of their retail partners regarding covered products. Those with direct sales systems must modify them to apply the fee to sales into California according to a state-mandated fee schedule. Some large manufacturers and retailers have stated their primary compliance costs in California consist of programming changes costing several hundred thousand dollars. In addition, there were ongoing dialogues with vendors over what products were covered and under what fee category that were time consuming. Best Buy said its non-labor costs were about \$800,000 by January 2005, but if labor costs were included, these costs would be much higher.<sup>22</sup> Maine is using a completely different financing scheme, but some problems were similar. Different interpretations among producers and retailers over what are covered products and what are not under Maine’s law resulted in extended negotiations by company officials and additional costs. There are also collection and transportation costs: one television manufacturer estimated that it would cost between \$20 and \$30 per TV to collect from the consolidation points and recycle.<sup>23</sup> The recycling industry also stated that tracking and maintaining a current understanding of different legislation and regulations will increase the liability and expense of electronics recyclers.<sup>24</sup>

All manufacturers will have to prepare an annual report to California State, and many manufacturers that have not already developed worldwide RoHS compliance plans will also face compliance costs with California’s RoHS provisions. One producer has already spent approximately \$45 million for the purchase of lead-free soldering equipment to comply with

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<sup>21</sup> Snohomish County, Washington, comments in Appendix VII.

<sup>22</sup> Interview with Paula Pahl, Best Buy, January 18, 2005.

<sup>23</sup> Interview with David Thompson, Panasonic, December 9, 2004.

<sup>24</sup> International Association of Electronics Recyclers, <http://www.iaer.org/aboutrecycling.htm>, May 2003 presentation.

RoHS. This estimate does not include technology R&D, quality assurance, and actual implementation costs. Nor does it include the costs for phasing out other RoHS materials.<sup>25</sup>

### *Creating a Market-driven Competitive Recycling Industry*

Recyclers say they need more volume and steady volume to drive costs and recycling fees lower.<sup>26</sup> Volume is needed to open regional recycling facilities. Increased volume increases the potential for more specialized recycling services to develop to serve niche markets more efficiently. A larger industry allows for better capitalized firms and therefore the development of more effective competition. It also allows for the creation of additional secondary markets for e-waste derived materials, commodities, and other assets.

For example, Minnesota has very good electronics collection systems and many recyclers, but it has no viable secondary markets for glass and plastics due to a dearth of companies using the recycled materials in new products. The lack of strong demand for recovered materials is not limited to Minnesota. In addition, a coordinated national system would enable producers to work together to design changes to their product that would lower the cost of recycling, such as making plastic casings easier to remove and reducing the number of different resins used in plastic casings.

### *Enforcement of the recycling program*

States face a problem with flight or non-compliance if they pass a recycling law on their own without the same law in neighboring states. States have no jurisdiction over consolidators or recyclers who may drive waste out of their state and dump or improperly dispose of it outside the state borders, thus avoiding state standards for environmentally sound management of e-waste. Similarly e-waste may move into a state to illegitimately collect state fees and payments on the material.

Consumers can take their business elsewhere. Visible ARFs in a state may encourage consumers to purchase products outside their state, but deposit it for recycling in their home state, thus cheating the system of funding. No one expects many Californians to drive to another state to avoid its ARF on electronic products. But what if Rhode Island or New Hampshire implemented an ARF? Similarly, requirements on producers by small states leave open the possibility of some manufacturers choosing to not sell in that state.

### *Enforcement on Internet sales and foreign manufacturers and distributors*

States have had difficulty in enforcing regulations evenly and fairly on all companies involved in the production, import, and sale of electronics, especially Internet and foreign sellers. States cannot enforce compliance on companies that sell into their state over the Internet but do not have a nexus in the state. California's Board of Equalization issued an opinion that the state cannot compel out-of-state retailers to collect the ARF.<sup>27</sup> Given the high

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<sup>25</sup> Interview with David Thompson, Panasonic, December 9, 2004.

<sup>26</sup> Institute for Scrap Recycling Industries, TA Roundtable transcript, p.62.

<sup>27</sup> California Board of Equalization, *Do I need to register if my business is located outside California?* <http://www.boe.ca.gov/sptaxprog/ewfaqs.htm#twelve> (22 December 2004). Also see *Publication 77, Do You Need to Register in California? For Out-of-State Sellers*.

number of electronic sales over the Internet, this could form a significant loophole for companies to avoid paying an ARF or assume responsibilities for costs in a producer responsibility system. Many stakeholders believe only Federal Government legislation can solve the problem of free riders.

### Electronics Recycling Terminology

Advance recovery fee (ARF), advance recycling fee, or advance disposal fee (ADF) is paid by the consumer at the point of sale when purchasing a new product and used to finance some part or all of the recycling process.

Cost internalization (CI) refers to a financing model in which all product lifecycle costs are borne by the producer and are included in the total product cost. The producer has the option of passing the additional costs of recycling or regulatory compliance onto the consumer through higher prices or absorbing part or all of the cost, but there is no visible and separate fee collected by the retailer when the product is sold.

Partial cost internalization (PCI) refers to a system in which the producers are responsible for some level of consolidation and all processing and recycling, and the government is responsible for collection.

Collection incentive payment (CIP) provides financial incentives to organizations to collect e-waste.

Design for environment (DfE) is a pollution prevention and resource conservation design process.

Design for recycling (DfR) means designing for ease of disassembly, parts identification, and recycling.

End of life (EOL) fee is paid by the final owner of a product when the product is dropped off for disposal or recycling.

E-waste and e-scrap are popular terms for consumer and business electronic equipment that is near or at the end of its useful life. Recyclers prefer the term “e-scrap” since “waste” refers only to what is left after the product has been reused, recovered or recycled. “E-waste” is the most commonly used term.

Historic products are old electronic products entering the waste stream that generally are too old to have value for reuse or refurbishment or any other purpose.

Orphan products are those for which 1) the manufacturer no longer exists and a successor cannot be identified, 2) no manufacturer can be identified or 3) the manufacturer cannot be compelled to participate in the recycling system. In an extended producer responsibility (EPR) system, the cost of recycling orphan products must be borne by entities other than the original manufacturer.

Producer responsibility and the EPR models shift most if not all the cost of the recycling process onto the producer. In an EPR system, the cost of recycling orphan products must be borne by entities other than the original manufacturer.

Product stewardship is a product-centered approach to environmental protection. It calls on those in the product lifecycle—manufacturers, retailers, users, and disposers—to share responsibility for reducing the environmental impacts of products.<sup>28</sup> Product stewardship embraces the concept that products have materials in them that have a value; and that value should be captured, preserved and returned for use in commerce. The Product Stewardship Institute includes governments on the list of stakeholders involved in the product life cycle.

Shared responsibility is a concept that end-of-life management responsibility should be divided, but not necessarily equally, between the producers, retailers, consumers, and recyclers, or disposers.

Third party organization (TPO) is a non-profit organization that provides the management and administration of a recycling program for its members. The TPOs’ membership is often made up entirely of manufacturers of the product being recycled, but it can include government and other members.

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<sup>28</sup> EPA, [epa.gov/epr](http://epa.gov/epr) (June 15, 2006).



## **CHAPTER II**

### **ELECTRONICS RECYCLING SYSTEM MODELS**

In looking at models of existing and proposed electronics recycling programs, the components are similar:

- Defining the products to be included in a recycling program.
- Collecting used product from the consumer and transporting it to a recycler.
- Recycling the product; triaging for reuse, refurbishment, or recycling; and minimizing waste.
- Financing each part of the system.
- Creating a market for recycled materials.

The main differences between various recycling programs are who collects the electronics; who pays for each part of the process; and what incentives are built into the system to change product design, encourage market-based collection and recycling, and encourage a commercially sustainable use for recycled materials. This report will examine these different component parts.

#### **Product Coverage**

The main issues regarding product coverage are whether to start with a broad and inclusive list or a narrowly defined list of products, and whether to limit a recycling program to household electronics or include business electronics as well. Opinions varied widely. For example, several commentors stated that covered items should be the same as those under the EU's WEEE Directive. Some, such as Minnesota's Office of Environmental Assistance, supported a broad scope of products given the buying and disposal habits of consumers. Dell stated that covered products should "focus on those products containing environmentally sensitive materials." IBM supported recycling all information technology products.

Other commentors supported a more narrowly defined product scope. For example, although never finalized, NEPSI participants compromised in February 2004 on the following list of covered products: CRT and flat panel televisions, stand alone computer CRTs and flat panel monitors greater than 9 inches; laptop/notebook computers; CPUs; small peripherals (mice, keyboards, cables, speakers); and consumer desktop devices (printers and multifunction devices). The stakeholders agreed on a process to consider new products to be added to the list on a regular basis. This list has the advantage of being easy to explain to consumers since it is basically televisions and computer equipment. It limits the universe of producers involved to television and computer equipment manufacturers without including cell phone and stereo equipment manufacturers. Many organizations responding to the Federal Register notice request for comments agreed generally with the scope of products endorsed by NEPSI



in February 2004, with an occasional addition of cell phones, personal digital assistants (PDAs), television peripherals or audio equipment.

Most state laws and proposed legislation regarding electronics recycling have focused on CRTs in televisions and computer monitors. Five states ban CRTs from landfills and the statewide electronic recycling programs focus on CRTs. For example, California's Electronic Waste Recycling Act of 2003 covers CRTs, liquid crystal display (LCD) monitors, and laptop computers. Maine's Act to Protect Public Health and the Environment covers CRTs and central processing units (CPUs). Maryland's Statewide Computer Recycling Pilot Program covers computer monitors, computers and laptops. Washington's new Electronic Product Recycling Law focuses on televisions, computer monitors, and desktop and laptops computers.

Televisions and computer monitors currently represent the bulk of electronic products by weight (excluding appliances, also known as "white goods") being disposed of by households. An e-recycling demonstration project in 1999 found that, out of 575 tons of used electronics (24,000 pieces), televisions represented 25 percent of the total number of items collected and 69 percent of the total weight collected. Computer monitors represented 7 percent by weight and CPUs and computer peripherals were another 5 percent. Telephones, radios, fax machines, handheld electronics, stereos, and other personal electronics represented 12 percent by weight, and small household electrical goods such as microwaves, curling irons, and small kitchen appliances were another 7 percent of products.<sup>29</sup>

Some recycling programs start simple with a limited number of products and then add products as time goes on. This has the advantage of phasing in a program slowly and allowing for future additions as the types of products being disposed changes. Limiting the products also limits the scope of stakeholders involved in the program and may make it easier to introduce design and recycling incentives that can be narrowly targeted to specific products. The Electronics Industry Association (EIA) recommended a short list of products to start: computer monitors, portable computers, and televisions with video displays greater than nine inches.

The number of covered items has consequences for the size of the collection program required and, if a fee is collected at the point of sale or at the time of disposal, the administrative costs for retailers and/or collection points. The Retail Industry Leaders Association preferred starting with a limited number of products and a clear timetable for expansion of the list with changes occurring no more than once a year. Most importantly, it stated that the definition of covered products should be clear, limited, and easy to understand, a view echoed by individual retailers and other commentators.

The Cellular Telephone Industry Association (CTIA) Wireless Association argued in its comments that mobile phones and devices are different from other electronics and, given that the cellular industry started a voluntary national recycling effort in 2003, it would like a

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<sup>29</sup> Minnesota Office of Environmental Assistance, *Recycling Used Electronics: Report on Minnesota's Demonstration Project*, July 2001, p. 46, <http://www.moea.state.mn.us/plugin/ElectronicsReport.pdf>.

definitive Federal endorsement of a voluntary national recycling program for its industry. CTIA's recycling program is described in its letter in the Appendix.

The EU WEEE Directive's comprehensive approach is in stark contrast to U.S. state legislation and NEPSI. The EU WEEE Directive covers electronics, appliances, tools, and medical devices. Producers must mark electric equipment with the symbol of a wheeled trash bin with an "x" through it after August 2005 to remind consumers that the used product cannot go into the garbage, but must be recycled.

Some argue that there are important advantages to starting with more comprehensive product coverage. The products covered under a recycling program define the manufacturers, retailers, consumers, and other stakeholders that will be involved. Starting with broad product coverage could bring all the stakeholders to the table when devising a new recycling program without having to try to make new industry sectors fit in later. Convergence is another argument for broadening product coverage. As the function of products such as computers and televisions, cameras and phones, music systems and computers converge, the companies manufacturing these products would need to be part of the product stewardship plan from the beginning. In addition, it is not always easy to define into what category a product fits.

There are other potential advantages to starting with more comprehensive product coverage. It would provide a higher volume of product driven to recyclers. A greater range of products could share similar design-for-environment (DfE) or design-for-recycling (DfR) characteristics which might decrease recycling costs. A wider product range might increase opportunities for creating uses and markets for the recycled materials. In addition, no matter which recycling and financing systems are used, they will require the creation of administrative infrastructures. It may be more efficient to set up these infrastructures and costs once. Finally, there is the education of the consumer or the disposer of the product. Consumers may not remember which items are allowed and which are not. As the point was made by participants at the 2004 Roundtable on Electronics Recycling, based on experience with recycling collection events, consumers will try to bring in everything whether it is on the approved list or not, so the system should be prepared to handle a broad product stream.

While this report focuses on household e-waste, a number of commentators recommended that a national solution cover both household and business electronic products. Collection issues are, however, quite different for household and business e-waste. Moreover, many businesses currently recycle their used electronics, since disposing large quantities of electronics is subject to state or Federal waste laws, and many vendors currently offer takeback services as part of the purchasing contract. The Electronics Industry Association brought up another issue that could arise from differentiating between household and business end-of-life electronic products: "Some companies do not see a reasonable mechanism to limit the products so that businesses do not take advantage of the system in place for household products. This is a particularly difficult challenge if an advance recovery fee is assessed at the time of sale, and businesses are exempt from the fee if they purchase a certain number of products in one transaction."

Despite the range of opinions on the products to cover in a recycling program, many stakeholders expressed willingness to compromise on a narrower or broader list of products, and most specifically the NEPSI list, in order to move the discussion forward. The main concern was that the list of products be very clearly defined and easily understood.

### **Collection from Consumers**

The mantra articulated by numerous stakeholders is that electronics should be as easy and convenient to recycle as they are to buy. This is the same goal underlying the NEPSI discussions. The collection points used by other recycling programs and recommended by commentators include: curbside pick up, local government drop-off centers, ongoing drop off at retailers of electronic products, one-for-one takeback by retailers, producer-established drop-off centers, mail-back to producers, ongoing drop off at non-profits or other private sector participants, and sporadic collection events. The main issues in collection of e-waste from consumers are whether the government or private sector is responsible or share responsibility in some way; whether the government mandates the participation of certain entities for collection; and whether the program encourages the voluntary participation of entities for collection through financial or other enticements.

The local government takes responsibility for collection in a number of existing recycling systems. Some systems mandate the participation of retailers in taking back products. A number of commentators stated they would support a collection system arranged and financed by manufacturers who partner with specific retailers or other entities as long as the system is convenient, free to customers, and does not result in an unfunded mandate to local governments. They recommended a “collection incentive payment” (CIP) to any collector type that meets certain standards, in order to encourage a diversity of entities. EIA recommended that local government have the primary responsibility for collection and should engage other local actors such as non-profits, retailers, and recyclers. EPA’s Plug-In to eCycling program partnered with major retailers and manufacturers to pilot these different collection programs around the United States in collecting millions of pounds of scrap, as is discussed elsewhere in the report. How well these collection systems work varies by the community.

One of the costs incurred by collection centers is the cost of carefully managing the unwanted electronic products so as not to damage them further. If the discarded electronic products are to eventually go into a triage system to determine if the product can be reused or refurbished or dismantled for parts, as is done for much commercial discarded electronic products, then the product must be kept intact. Even if the product is bound for recycling, it must be carefully managed since a different level of regulatory requirements govern if the product is broken and safety measures must be taken to prevent exposure to lead dust. All products must be handled and prepared for transport. This is different from the collection of cans, plastic containers, and newspapers that can be thrown in a large bin or back of a truck, and such additional handling requirements represent considerable cost. A demonstration project in Minnesota found that shipping 535 tons of discarded household electronics to the recycler required an additional 125 tons of transport packaging. This study found that the most economical way to ship and prepare the televisions and computers (monitors and CPUs)

was on pallets, bound by shrink-wrap. All other products were best managed by placing them in gaylord boxes (oversized corrugated containers). In this study, the cost of shipping materials from collection sites to the central facility was the largest single expenditure (38%) by the recycler.<sup>30</sup>

Every collection system depends on consumer participation and—in systems where participation is mandated—consumer compliance. Switzerland’s legislation, for example, placed a legal obligation on consumers to return out-of-use electrical and electronic products and to not dispose of them in the municipal waste system. Governments can ban disposal of e-waste in normal residential waste streams, as it does in some countries, states, and local jurisdictions, but compliance by consumers is still dependent on consumer awareness, convenience of collection, and enforcement. Retailers, producers, governments, and non-profits can all take on the task of consumer education campaigns to inform citizens. The Rechargeable Battery Recycling Corporation (RBRC) found consumer education regarding disposal one of its biggest challenges. While it is easier to put a battery in the trash unnoticed than a television or computer, compliance by consumers will still be an enormous challenge. In some recycling systems, the government sets escalating collection targets for industry to meet, thus involving industry in consumer education and making sure proper disposal is convenient.

#### *Curbside*

Curbside pick up may be the most convenient means of managing end-of-life electronics for the household consumer. Many consumers already recycle bottles, cans, plastic containers, and newspapers this way. Curbside service providers—government or the private sector—could incorporate weekly or monthly pick up of electronic items into their regular pick ups. One problem with this system is the cost. Whereas bottles, cans, plastic containers, and newspapers are plentiful and so result in high volumes for weekly pick ups, electronics will have a relatively low volume. Establishing a separate system for handling such a low volume could be very expensive. Minnesota has a recycling program in Hennepin County where 1.1 million people, 22 percent of its population, lives. It has curbside pick up in Minneapolis City, where the volume is most consistent given a high population, and picks up 32 percent of the overall program e-waste this way. But in the outlying areas, it does not offer curbside pick up; instead it provides two permanent drop-off facilities, which collect 50 percent of program collected e-waste, and sponsors one-day collection events, which account for the rest of the collected scrap. Another problem is ensuring the quality of the material, if collection agents hope to reuse or refurbish products. The nature of e-waste and the need to carefully wrap and protect the disposed electronics make curbside pickup difficult.

#### *Municipal Drop-off Centers*

Local government drop-off centers may not be as convenient for the consumer as curbside collection, but may be a more reasonable alternative for low volume items such as unwanted electronics that also require special handling. Many local governments already have one or more drop-off centers for other types of recyclable waste. This does not mean that these

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<sup>30</sup> Minnesota Office of Environmental Assistance, *Recycling Used Electronics: Report on Minnesota’s Demonstration Project*, July 2001, p. 58, <http://www.moea.state.mn.us/plugin/ElectronicsReport.pdf>.

facilities are universally accepted as appropriate. Snohomish County in Washington State stated in its comments that many existing government facilities are inadequate for handling electronic products: of the 10 solid waste facilities in Snohomish Country, only one was judged able to collect e-waste when assessed in 2002.

There are several options for financing local government curbside collection and drop-off centers. Local governments could increase the cost of trash collection to the taxpayers' to cover this service. Then, the cost of electronics recycling would be borne by all taxpayers or ratepayers, not just consumers who generate e-waste. The local government could charge an end of life fee to those consumers who leave electronics curbside for pick up, which would require more complicated billing procedures than are currently in place, or charge an end of life fee at a drop-off center, which entails having staff at those centers handle money, something many of them are not doing now and would require training and more administrative controls. One idea suggested by several commentators is that the local government could receive a payment for its collection service from a third party entity financed by producers or a collection of various parties. Alternatively, curbside pick up could also be accomplished without local government involvement, by private contractors paid by a third party organization (TPO).

### *Retailers*

Many retailers serve as collection centers for other product recycling programs, such as paint, bottles, and tires. Retailers of electronic products are an obvious choice for a drop-off center in consumers' eyes according to a recent survey. Sixty-one percent of respondents in a 2002 survey on electronics recycling said they would prefer to take their computers and electronic products back to a retailer for recycling, even if free recycling were also offered at local landfills, transfer stations, or via shipping to the original manufacturer.<sup>31</sup> Retailers generally already have a system for taking back defective or returned product and shipping it back to the manufacturer. Staples tested reverse logistics collection schemes in the Northeast in 2004 as part of its Plug-In to eCycling program. It used the same distribution channels that deliver the new products to the retail stores to collect and transport the old electronics to the distribution centers. The results of that pilot are available online.<sup>32</sup> The Minnesota Office of Environmental Assistance (OEA) ran an e-recycling demonstration project in 1999 utilizing different collection strategies, i.e., retail drop off, curbside collection, and single-day and multiple-day events. Retail drop off was the most successful collection strategy employed during the project. Participating retail stores drew the largest number of participants and had the lowest cost per participant.<sup>33</sup>

Retailers feel strongly that any state or national recycling program should not mandate in-store takeback but should allow flexibility for various collection points, allowing retailers to

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<sup>31</sup> SoundStats for Washington Citizens for Resource Conservation, Public Opinion Research on Electronics Recycling, August 2002 [www.prrbiz.com/WCRC\\_Report2.pdf](http://www.prrbiz.com/WCRC_Report2.pdf).

<sup>32</sup> See <http://productstewardship.us/pilottakebackstaples.html>.

<sup>33</sup> Minnesota Office of Environmental Assistance, *Recycling Used Electronics: Report on Minnesota's Demonstration Project*, July 2001, <http://www.moea.state.mn.us/plugin/report.cfm>.

voluntarily participate. The retailers at the Roundtable and in subsequent comments made the following points:

First, the retail industry varies from small mom-and-pop stores to large national chains. Some stores are very small and do not have the space to take back and store large televisions and computers. A representative from Radio Shack made this point during the Roundtable. Radio Shack stores operate in very crowded spaces and do not carry large televisions. In addition, Radio Shack is undergoing a change similar to that of many others in the retail industry; getting rid of the stock room and moving to just-in-time inventory. Soon, all products in the store will be on the display shelves thus maximizing selling space and eliminating the stock room where returns otherwise would be held. However, many retailers deliver larger sized products to their customers that come straight from the warehouse. This could allow for one-for-one takeback, with the customer's old unit returned to the warehouse, not the store.

Second larger chains can hold one-time or regular take-back events in their large freestanding parking lot with products being packed into large trucks. Smaller retailers often lease space in multilevel malls or strip malls and have no ability to commandeer the parking lot for special events.

Third, much of the products being disposed of presently are the large and heavy console televisions and personal computers. In stores not selling products this large, the employees are not trained in lifting, carrying, and packing these heavy products. Thus, employers would have to incur training costs to prevent injuries.

Fourth, some retailers, such as department stores, carry limited electronics, sometimes only as specialty items or on a seasonal basis. Any law mandating participation of retailers as collection centers would probably need to take these differences between retailers into account.

Nevertheless, many small and medium retailers are voluntarily involved in the on-going collection of electronics, such as in the Take it Back Network in King and Snohomish Counties, Washington, predominately made up of small mom-and-pop retailers. Many retailers have been experimenting with limited time collection events to see if increasing the traffic to their establishment is profitable. A number of retailers volunteered to participate in EPA's Plug In programs and sponsored collection events around the country.

#### *Private Drop-off Centers*

Producer established drop-off centers are another option. These could be co-located with retailers and government drop-off centers or operated separately. From a consumer convenience perspective these would, ideally, not be brand specific, but would accept all products on the covered list. It could be operated by a company seeking to take responsibility for its products/share of products or be operated by a TPO.

#### *Mail Back Programs*

Producer mail back programs consist of the consumer mailing the product back to the original producer. Several computer manufacturers have mail-back programs in place with



varying features. In 2004, HP and Dell customers could fill out a form online describing the product they wish to mail back and agree to pay a fee, approximately \$20-\$60 to send back various pieces of a personal computer to HP or \$30 for a personal computer to Dell.<sup>34</sup> The company would send packing materials and a label to the consumer and arranges for pick up from the residence. This is labor intensive for the consumer, as well as costly. The inconvenience and cost probably limits participation in these types of mail-back programs. Mail back also tends to have high transportation costs. In a pilot HP ran with Office Depot nationwide in the summer of 2004 for seven weeks in which consumers could drop off one piece of electronic equipment a day for free at an Office Depot for recycling, HP received 10.2 million pounds or 425,000 items, a number which dwarfed its mail-back program.

In a 2002 survey, only five percent of respondents said they would choose to pay for shipping to mail their computers in for recycling. If free shipping were offered, the percentage of respondents choosing this method increased to 20 percent.<sup>35</sup>

### *Other Collection Sites*

Other collection site possibilities exist as well, such as electronic repair shops, haulers, private recyclers, or charities, where electronics often end up at or near their end of life. For example, Snohomish County in Washington State used a network of 14 small electronics retailers in their collection program.

### *Flexibility*

Legislation can mandate collection points, as a number do. One drawback of mandating collection points is that it can restrict flexibility for the local community to decide what best serves its needs. Some retailers, as mentioned above, may not necessarily be able to serve as collection points, while others may benefit from doing so. Non-profits, such as Goodwill, may be more convenient for consumers in some communities. Some communities may be willing and able to have the local government's solid waste division act as primary collector and some may not. Maine's sparsely populated areas will be served by one-day collection events, in which the collection site may be the back of a truck trailer. The State of Colorado's Office of Energy Management and Conservation relies on local government to manage e-waste. Where local government has not been able to afford to fully bear the costs, local businesses have often stepped up in partnership with local governments. The State of Colorado supports national strategies that favor public-private sector cooperation that encourage entrepreneurial efforts.

### *Transportation to Consolidator/Recycler*

Collected product must be transported from the collection point to a consolidator or recycler. The consolidator may also be the recycler, and the consolidator may also serve as the public collection point. As mentioned before, since televisions and computers are bulky and must be carefully prepared, shipping and handling costs are very high relative to most other

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<sup>34</sup> HP ([www.hp.com](http://www.hp.com)) and Dell ([www.dell.com](http://www.dell.com)), November 2004.

<sup>35</sup> SoundStats for Washington Citizens for Resource Conservation, Public Opinion Research on Electronics Recycling, August 2002, [www.prrbiz.com/WCRC\\_Report2.pdf](http://www.prrbiz.com/WCRC_Report2.pdf).

recyclables. Therefore, it is likely to be more cost efficient to minimize transportation costs by locating recycling centers locally or regionally if the volume is sufficient.

## **Recycling**

The Resource Conservation and Recovery Act (RCRA), enacted by Congress in 1976, gave EPA the authority to control disposal of solid and hazardous waste by large businesses and organizations. Residential waste is exempt from Federal hazardous waste regulations; however residential non-hazardous waste does have restrictions through the state solid waste regulations. In general, materials classified as hazardous waste, such as CRTs disposed of by a commercial source or large organization, face additional restrictions that increase the cost of handling and recycling. To encourage recycling, particularly of e-waste generated by commercial sources, the EPA proposed to conditionally exclude CRTs from hazardous waste regulation, provided that the CRTs were managed in certain ways. This proposed exemption<sup>36</sup> would allow recyclers to transport CRTs in common carriers, accumulate larger quantities, and hold them without obtaining hazardous waste permits. EPA has used the Universal Waste rule to encourage recycling of other products, such as batteries. EPA's 2002 proposed rule on CRTs received considerable comment. (RCRA, the Universal Waste rule and the case of batteries are discussed in detail in the Appendices.)

There is an existing infrastructure of recyclers working with electronic products globally and in the United States. The Institute for Scrap Recycling Industries (ISRI) has 1,200 member companies, 200 of which are involved with electronics recycling. The International Association of Electronics Recyclers claims over 100 member organizations in 15 countries.

Scrap recyclers process around 125 million tons of materials a year on a wide variety of products.<sup>37</sup> Recycler is a catch-phrase for a company providing a number of different services and processes. Consolidators and recyclers engage in asset management. First, they perform a triage on products received, not just electronic equipment, sorting products into ones that can be reused or refurbished, then sending the rest to be demanufactured into component parts that can be resold, and then processed further into individual commodities, such as ferrous, non-ferrous, plastics, glass, and metals. A consolidator or recycler would also be a logical party to sort the product into brands to either count how much of each brand is being recycled in a year (information that might be used to determine each producers' share of the recycling costs) or, at an additional cost, to sort by brand in order to return product to the original producer. Brand sorting is time consuming. (One of the commentators opined that future use of radio frequency identification (RFID) tags at the product level will greatly decrease the time and costs involved in brand sorting, making it a more viable option.)

The opportunity for profitability in reuse and refurbishment of electronic products and in selling components increases as volumes increase<sup>38</sup> and as the age of the products decrease. Computers and televisions that are under five to seven years old discarded by commercial

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<sup>36</sup> The final rule is expected in 2006. Check [www.epa.gov/](http://www.epa.gov/) for the final rule.

<sup>37</sup> Institute for Scrap Recycling Industries, TA Roundtable transcript, September 21, 2004, p. 26.

<sup>38</sup> Institute for Scrap Recycling Industries, TA Roundtable transcript, September 21, 2004, p. 62-63, 113.



entities or large organizations may have reuse value and usually represent a large amount of uniform or similar products or models so recyclers can realize economies of scale in selling for reuse, refurbishing, or recycling. Often, when a business replaces its computer equipment, the new vendor will arrange for proper management of the old equipment and includes those costs in the contract.

Equipment that cannot be reused as is or cannot be refurbished for resale is slated for scrap. The computer or television is broken into component parts. The plastic casing of a personal computer, for example, can be removed and the plastic can be shredded and used for other purposes; the circuitry can be broken into components that can be reused and resold; and metals that are left can be separated, smelted, and sold. Often the plastic and metals are melted together in a metals recovery process where the plastics are consumed in the smelting adding some minimal BTU value to the smelting. Much of the plastic in e-waste has significant embedded energy and could be burned to create energy in waste-to-energy plants, but given the presence of flame retardants in certain returned plastic parts and the difficulty in generating a pure plastic input stream this is not a common end use market for e-waste at this time. Some components may be sent to other recyclers or subcontractors who specialize in that particular material. But, the use of precious metals and other valuable materials that were worth recovering is decreasing due to substitutions by manufacturers of other substances with new and better connectivity. Lead and mercury use in products is declining due to environmental concerns and bans on these substances.

Once the leaded glass in the CRT or television screen is removed from the plastic casing, it can either be reused whole in another CRT or television, smelted, or broken into small pieces to be processed. Large commercial manufacturers of CRTs have mostly moved overseas thus greatly reducing any market in the United States for reuse of CRTs. There is still a market overseas for reuse of CRTs. Disassembling the CRT unit, transporting the heavy glass, and cleaning the glass before it can be returned to the manufacturing process adds significantly to the costs for reuse of the glass.<sup>39</sup> If it is not economically feasible to reuse the CRT glass or there is no market for that size of CRT screen, the glass is sent to either a smelter or a reprocessor that crushes it, or it enters the waste stream, i.e. goes to an incinerator or landfill. Some of the large reprocessors and smelters are charging fees to take the CRT glass because they cannot profitably process it.<sup>40</sup>

The business models for residential e-waste have proved less successful than for commercial e-waste.<sup>41</sup> Homeowners tend to keep electronics long past the time in which they would have any value for resale. While commercial e-waste is generally in working condition, residential electronics are often too old or broken to be of much use. Some researchers estimate that nearly 75 percent of old electronics are in storage as consumers hoard them, feeling that they may still have value and being uncertain of how to dispose of them. Research in California has found that residents who store computers and televisions store an average of 1.4 of each

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<sup>39</sup> Panasonic, TA Roundtable transcript p. 31.

<sup>40</sup> Interview with Unicor, June 15, 2006.

<sup>41</sup> Institute for Scrap Recycling Industries, TA Roundtable transcript, September 21, 2004, p. 62-63.

item.<sup>42</sup> A 2003 survey in King County, Washington, found that 25 percent of households reported storing at least one computer no longer in use, and 16 percent reported storing a television.<sup>43</sup> Hoarding is a potential problem in the establishment of a recycling system because older or historic waste has little recycling value and contains more orphan products.

Televisions in the waste stream tend to be 15-17 years old and computers 6-10 years old. Roughly half of the televisions collected during a 1999 recycling demonstration project were manufactured before 1980. Because televisions take longer to show up in the waste stream, they have a much lower possibility for refurbishment/resale and therefore cost more to recycle relative to computers. The underlying material stream is also much older and less likely to be recyclable, such as wood on console televisions or plastic that imitates wood. The CRTs in televisions are larger than those in computers. Televisions have less metal which can be smelted and reused, and they have no valuable components that can be separated and reused. Older televisions have capacitors containing regulated polychlorinated biphenyls (PCBs)—known carcinogens—which were phased out of televisions in the late 1970s and early 1980s. Materials such as these in older products make disassembly more difficult and increase the costs of properly managing products at end-of-life.<sup>44</sup> In addition, mixed e-waste, such as that received from residential consumers, requires special handling and the costs exceed the market value of the scrap. It cannot be processed profitably and in an environmentally sound manner without additional funds to cover the costs.

A recycling system in which resources are conserved and reused is easier with new products that are designed for that purpose. Many stakeholders have concluded that historic products with high recycling costs need to be flushed out of the system, which is the purpose of many current collection programs including special one-day or one-time-only collection events. Office Depot and HP collected and recycled 10.5 million pounds of e-waste in a Plug-In to eCycling pilot program in 2004, while other Plug-In to eCycling pilot programs collected hundreds of thousands of pounds.<sup>45</sup>

#### *Export of E-waste*

Much e-waste has been sent overseas for recycling because it is more costly to recycle in the United States and most consumer electronics manufacturers (who provide the market for materials recovered from recycled electronics) have moved overseas. For example, almost all glass manufacturers that may reuse CRTs are located overseas. A 2002 report estimated that between 50 to 80 percent of the wastes collected for recycling are not recycled domestically but are exported to other countries.<sup>46</sup> According to the Polymer Alliance Zone of West

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<sup>42</sup> California Integrated Waste Management Board (CIWMB), Electronic Product Management website, *What is E-Waste?* <http://www.ciwmb.ca.gov/Electronics/WhatisEwaste/>, March 2004.

<sup>43</sup> Cascadia Consulting Group, Inc. and Sound Resolutions, King County Solid Waste Division 2003 Survey as reported in *E-Waste Generation in Northwest Washington*, November 21, 2003, p. 7.

<sup>44</sup> Minnesota Office of Environmental Assistance, *Recycling Used Electronics: Report on Minnesota's Demonstration Project*, July 2001, <http://www.moea.state.mn.us/plugin/report.cfm>.

<sup>45</sup> See Appendix IV.

<sup>46</sup> *Exporting Harm*, Basel Action Network and Silicon Valley Toxics Coalition, February 2002, <http://www.ban.org/E-waste/technotrashfinalcomp.pdf>.

Virginia, most participants in the electronics recycling industry cite export to Asia as the most common management practice for U.S. plastic scrap from end-of-life electronics, often through brokered arrangements.<sup>47</sup>

Five states have banned the disposal of CRTs in landfills and incinerators within their borders, forcing these products to be recycled, disposed of outside of the state, or exported. The states have no control over e-waste transported outside of their borders. As of the writing of this report, the Federal Government does not control the export of most electronic scrap either, for while controls exist on the export of hazardous waste, many electronics are not classified as hazardous waste (either because they do not fail hazardous waste tests or are not yet considered waste, e.g., they are reusable as is or the materials represent salable commodities). Several environmental groups maintain that efforts by states and by EPA to regulate the disposal of electronics and create a recycling infrastructure or market-driven industry can be undercut if e-waste can be exported to entities that do not enforce environmentally sound waste management. Recyclers respond that outlawing the export of e-waste completely could deprive the industry of flexibility or end-markets since it may be more cost effective to recycle some products overseas where much of electronics manufacturing and assembly are centered and where there may be larger markets for older technology and materials.

### *Reducing Recycling Costs*

Some stakeholders have suggested ways to bring down the costs of processing electronics while maintaining environmental standards. One is to improve economies of scale through increased volume. Exempting e-waste from restrictive hazardous and solid waste regulations and reclassifying it would also lower costs. Several industry players commented that an effective way to reduce recycling costs is to provide the recycling industry with the flexibility to manage e-waste on a national and international basis by harmonizing standards for managing e-waste. Another way is to redesign products to improve the ease of dismantling, reuse, and recycling.

Most discussions in electronics recycling revolve around DfE, a process to change product design in order to make it more environmentally friendly, or DfR, a process to introduce changes to product design in order to make products more easily recyclable. For example, Matsushita (Panasonic) reduced the number of polystyrene resin grades from 20 to 4 making sorting during disassembly easier. In 2000, Dell introduced a new line of OptiFrame™ chassis, the OptiPlex GX150, which contains fewer screws for easier upgrading and disassembly. The economic benefits of designing products that are more easily reused, refurbished, and broken down into reusable components and recycled materials take a long time to be realized. As mentioned earlier, televisions in the waste stream tend to be 15-17 years old and computers 6-10 years old. Given the long pay back period, introducing design changes does not provide much short-term financial incentive unless coupled with an external stimulus. The changes mentioned above can lower costs, but would be much more

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<sup>47</sup> Interview with Buddy Graham and Walter Alcorn, Polymer Alliance Zone of West Virginia, January 21, 2005.

effective if undertaken across industry. Arguably none of the different financing systems discussed widely to date provide direct financial incentives for DfR.

Hypothetically, once product coverage is determined making it clear which producers are affected by the recycling program, and if the recycling plan calls for producers to increase the recyclability of their product, or if producers are paying for recycling, there are incentives for producers to work together to jointly develop designs that reduce recycling costs. For example: making plastic casings easier to remove by minimizing the number of fasteners and the number of tools needed for disassembly; reducing the number and types of materials used and standardizing the types of plastic resins used; and using molded-in colors and finishes instead of paint, coatings, or plating whenever possible.<sup>48</sup>

Another way to affect design changes is for government to mandate them. Legislation has been used to mandate DfE changes to make products more environmentally friendly and resource conserving. For example, the EU and California both mandated design changes by banning certain substances. Many industry and government representatives believe that it is unnecessary for the United States at the Federal level or the state level to include explicit proscriptions for design in any comprehensive recycling program, in particular banning potential dangerous substances, since the RoHS Directive in the EU, coupled with the California law, are already effecting a global change in design. Their argument is that electronics is such a global industry with a global supply chain that all manufacturers and suppliers will make sure that their products, no matter for what other markets they are destined, will meet the RoHS Directive in order to assure that their products meet the requirements of the European market.<sup>49</sup> This may be the case, but it should be noted that some of the fastest growing PC and consumer electronics manufacturing and end-use markets are outside of the EU and United States.

Federal procurement requirements can also be used as a leverage to change. The Federal Government, for example, has voluntary programs now that Federal agencies can choose to join, such as the Federal Electronics Challenge (FEC) and the EPEAT, both designed for implementation initially in the federal procurement process but also intended for use by other institutional purchasers. The government can also develop incentives in the private sector for DfE through programs that reward environmentally friendly design, such as EPEAT, Energy Star, DfE Program, and the Green Suppliers Network, described elsewhere in this report.

One of the drawbacks of mandating very specific design changes is the inability to predict their effects over time or measure precisely the economic costs and benefits. For example, requiring the elimination of certain substances without knowing what substitutes will be utilized can result in unintended consequences. New studies and data are produced continuously, providing new insight into the environmental and human health effects of materials and chemicals utilized in production. New products may seem more easily recyclable, resource conservative, or environmentally friendly, but may not be when

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<sup>48</sup> Plastics Resource Council, *Plastics from Residential Electronics Recycling-Report 2000*, April 2000, p.12.

<sup>49</sup> TA Roundtable Transcript, p. 103.

considering the environment as an integrated and global system. Any system of product design requirements or incentives must be structured to evolve quickly to incorporate new data and understanding of product design and its consequences for human health and the environment. One major complaint of U.S. industry is that it has had insufficient input into the development and decision-making of government design mandates and should be fully engaged in these discussions.

### *Prison Labor*

Many organizations commented that recycling services by prison labor should be outlawed or that the laborers should be paid minimum wage. Recyclers cited unfair competition from Federal Prison Industries or Unicor. These commentators see Unicor as an impediment to creating a competitive electronics recycling market since its low labor rates keep prices down, reducing the incentive for private companies to enter the market. Unicor is a Federal Government corporation established by Congress in 1934 to employ and provide job training skills to prison inmates. It is self-sustaining and receives no appropriation from Congress. The inmates are paid, but receive less than minimum wage.

Unicor recycled 46 million pounds of electronics scrap in fiscal year 2004. The vast majority was used electronics from the Federal Government, schools, and non-profits, but also included residential scrap, mainly from one-day municipal recycling events. Unicor estimates it recycles one percent or less of total electronics recycled in the United States; yet in terms of CRTs, Unicor believes that it is one of the largest CRT recyclers in the United States. It recycled 4.8 million pounds of CRTs alone in fiscal year 2004.

Not all comments about Unicor were negative. The Indiana Recycling Coalition sees benefits in partnerships with prison labor programs, but stated that these partnerships should focus on providing service that cannot be provided cost effectively in the private sector. It should be noted that some communities and non-profits also run electronics recycling shops as job training programs where some trainees may not be paid minimum wage.<sup>50</sup> In addition, Unicor has agreements with over 300 private recyclers for taking secondary used product, particularly CRTs, after the private recycler has broken down the unit and extracted some materials, assumably the most valuable materials. Unicor believes that it is part of the solution and complements the private sector recycling effort because it gets the most difficult and least valuable materials to recycle from the private sector recyclers and can cost effectively and in an environmentally proper manner provide recycling and refurbishing activities here in the United States, providing an alternative to sending e-waste overseas. Because of Unicor's low costs, it can afford to refurbish product that private recyclers cannot, thus it has a higher reuse and refurbishment rate.

## **Financing Collection, Transportation, and Recycling**

There are a number of ways to finance a recycling program. NEPSI looked extensively at an array of possible models and combinations thereof, a number of which are described under

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<sup>50</sup> For example, Goodwill Industries runs job training programs, some of which may pay minimum wage and some of which may not.



the NEPSI section of the report. The Technology Administration does not take a position supporting any particular financing system. This document reports how various financing systems can be structured, reports how similar systems already in operation have been critiqued, and relays the analysis and comments of stakeholders on the advantages and disadvantages of various systems. Below is a discussion of the models most commonly used in e-recycling and recycling programs for other products and arguments presented by stakeholders both for and against these models.

#### *General Tax Base Funding*

The general tax base model is, compared to other approaches, relatively simple: an additional tax would be imposed at the state or national level to fund the state or national electronics recycling effort. The collected tax could fund the entire recycling process or just a piece of it—such as the collection and transportation to a consolidator or recycler—or it could change over time. As long as the tax was not applied at the point of sale, the general tax base model would remove the issue of creating a level playing field with Internet sales. This model has been easily and quickly implemented by locales to fund e-waste collection and/or recycling.

Denmark has used a local household waste tax to fund local authority collection, transport, and recycling of waste electronics and electrical products. Other countries in Europe such as the Netherlands and Norway have used municipal taxes to finance just local authority collection and/or municipal collection. These levels of tax vary by municipality.<sup>51</sup>

The general tax base model shifts the responsibility from specific consumers of these electronic goods and others in the product stewardship chain to all taxpayers. This financing system has no product stewardship or shared responsibility embedded in its design. Some stakeholders assert that financing through taxes provides no incentive to maximize recycling infrastructure efficiencies and gives producers no responsibility or incentives to design with the environment in mind. In addition, the taxes would be collected and held by the government. Critics point out that the government-collected taxes going into a general fund could be spent for other purposes than to fund the recycling system, a not uncommon practice for user fees. Finally, to implement this model on a Federal level would require that Congress levy the taxes.

Government grants or tax incentives to encourage the development of a recycling infrastructure is another mode of general tax base funding, if the funds come from the general fund, since all citizens pay for the recycling, not just the stakeholders. One report estimates that a grant program to encourage the development of a collection and recycling infrastructure in all 50 states might cost about \$10 million annually.<sup>52</sup> This estimate is extrapolated from a Massachusetts grant program for \$800,000 in FY 1999-FY 2002 to each of the state's 351 cities and towns for the first year in which they collected e-waste. Actual costs for a full-fledged recycling program would probably run much higher, according to officials in Snohomish County, Washington, where vendor costs alone for just the public

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<sup>51</sup> Department of Trade and Industry, *Study into European WEEE Schemes*, November 20, 2003, p. 46.

<sup>52</sup> James E. McCarthy, *Recycling Computers and Electronic Equipment: Legislative and Regulatory Approaches for "E-Waste"*, Congressional Research Service, November 5, 2003.

sector portion of that County's recycling system were \$218,000 for 2004 with a population of 640,000, amounting to \$0.34 per person.<sup>53</sup>

### *End-of-Life Fees*

End-of-Life (EOL) fees are defined as a cost paid by the end-user at the point of discard for the electronic device. EOL fees are presently collected for electronics in some regions of the country. The collection of EOL fees does not necessarily require legislation. According to commentators, the greatest benefits of EOL fees are that they provide immediate financing for a recycling system, pay for orphan products that are returned and for which a fee is paid, and the financing costs are paid by the consumer and not the taxpayer. Some also argue that the EOL fee provides an incentive to extend the life of electronic devices. An EOL fee program could encourage the development of market-driven recycling as collectors compete for consumers' products, thereby bringing down the fee. Further, some claim that an EOL fee could create the opportunity for producers to compete with traditional recyclers to collect and recycle end-of-life electronic products, and may thus encourage design-for-environment. Other points supporting the EOL are that it provides flexibility as to the collection centers since the financial incentive of the EOL fee encourages a diversity of organizations to become collection centers, thus obviating the need to mandate retailer participation.

Tire disposal in some states is financed through an EOL fee. Some commercial establishments have requirements on how to dispose of or recycle tires and, in turn, charge customers an EOL fee to cover their costs. The EOL fee is managed individually by the dealers; the fee is not sent to a TPO or the state, but covers the dealers own costs in properly disposing of the tires.

### **Orphan Products**

The number of brands in today's electronics waste stream is large. A study in Florida identified 111 brands of televisions, 295 brands of monitors and 221 brands of desktops in the waste stream there.<sup>54</sup> A pilot project of discarded household electronics in Minnesota found that 47 percent of collected televisions were manufactured before 1980 and 15 percent, representing 70 different brands, were orphan products, i.e., the manufacturer is no longer in business nor a successor identified.<sup>55</sup> Many of the companies that are still in the market have a very small market share now. So-called "white box" or no-name products that are put together by component assemblers without a brand name are also a problem because it is hard to know who to assess financial liability against in a financing system that involves the manufacturers. Paying for the proper recycling and disposal of orphan products is a consideration in the various financing systems discussed here.

Japan has used a system where retailers collected an EOL fee from consumer for appliances including televisions, which covered collection and transport costs as well as recycling costs imposed by the manufacturer. Some speculated that manufacturers there would seek to set their fees as low as possible to improve their competitive advantage and it would result in

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<sup>53</sup> Sego Jackson, Snohomish County Solid Waste Division, Washington State, March 2005

<sup>54</sup> Florida Department of Environmental Protection, *Florida Electronic Product Brand Distribution Project*, January 2005, <http://www.dep.state.fl.us/waste/categories/electronics/pages/FloridaElectronicProductBrandDistributionProject.htm> (10 January 2005).

<sup>55</sup> Minnesota Office of Environmental Assistance. *Recycling Used Electronics: Report on Minnesota's Demonstration Project*, July 2001, p. 8, <http://www.moea.state.mn.us/plugin/ElectronicsReport.pdf>.

manufacturers absorbing the costs of recycling to remain competitive with low EOL fees, however, the leading electric appliance manufacturers all set the same recycling fee for each appliance.<sup>56</sup> (For personal computers purchased after October 1, 2003, the cost of recycling is included in the cost of the product in Japan.<sup>57</sup>) Belgium also has used EOL fees along with an ARF to finance its national system.

Some people believe that U.S. culture may not be conducive to EOL fees. According to those who have managed recycling programs, a major drawback of an EOL fee is that the prospect of having to pay a fee can discourage consumer participation and encourage illegal dumping. As such, the system would require an enforcement infrastructure from the government and may provide only limited incentives for lowering fees over time. Some Maine municipalities found that EOL fees discouraged returns of electronics and resulted in illegal roadside dumping, although within Maine's hybrid financing system some localities continue to charge EOL fees.

Wooster, Massachusetts, also found that EOL fees led to dumping, so it stopped charging its residents a fee. (Many other local governments in Massachusetts continue to charge an EOL fee, however.) In a 2002 survey of residents of King County, Washington, it was found that when faced with a \$20 fee to recycle an old computer system, 34 percent of the respondents said they would store their computer at home instead of paying the fee. Another 4 percent admitted that they would put it in the garbage illegally.<sup>58</sup> Local governments in Oregon also found the EOL fees created illegal dumping situations.<sup>59</sup> There have been cases of supposed recyclers stockpiling and abandoning the collected electronics in a warehouse while absconding with the fees.

Others point out that EOL fees are also innately regressive.<sup>60</sup> Electronics products may have many owners as products are reused, refurbished and resold, so this fee would fall to the final user, often the lowest-income consumer or a charity, to fund the majority of the recycling system. For example, many Goodwill locations will not accept television or computer donations any longer because of the high cost of disposing of these products. Goodwill Industries estimated it was receiving 200,000 computers a year in 2004, but only 15 percent were reusable, so it had to pay to dispose of the rest of them. Disposal costs are driven in large part by tipping fees (i.e. the cost paid for unloading a truckload of scrap at a landfill) which can be quite high; for example, California tipping fees were up to \$85 a ton in 2004.<sup>61</sup>

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<sup>56</sup> EPA, Office of Solid Waste, "'Greening' of Electronics Product Design: A Brief Summary of Government and Private Initiatives," p. 5, March 26, 2002.

<sup>57</sup> Inform, *PC Recycling in Japan*, February 2004, [http://www.informinc.org/fact\\_JapanPC.pdf](http://www.informinc.org/fact_JapanPC.pdf) (13 June 2006).

<sup>58</sup> Washington Citizens for Resource Conservation comments in Appendix VII and [www.prrbiz.com/WCRC\\_Report2.pdf](http://www.prrbiz.com/WCRC_Report2.pdf).

<sup>59</sup> Oregon Department of Environmental Quality comments in Appendix VII.

<sup>60</sup> Patrick Daniere, Goodwill Industries, presentation at E-Scrap 2004: The North American Electronics Recycling Conference, October 20, 2004.

<sup>61</sup> Patrick Daniere, Goodwill Industries, and Neal Road Landfill Annual Report June 8, 2004, [http://www.buttecounty.net/publicworks/solidwaste/2004\\_Annual%20\\_Report.pdf](http://www.buttecounty.net/publicworks/solidwaste/2004_Annual%20_Report.pdf).



### *Deposit and Refund*

The deposit/refund system is used with beverage containers in certain states in the United States and in Canada. Alberta has an 80 percent recovery rate for beverage containers using a deposit/refund system. The consumer makes a deposit at the time of purchase of a new product and receives a refund upon returning the used container. The refund would be less than the deposit, thus funding the system. The refund provides an incentive to consumers to return the product. It encourages scavenging to recover product that has been thrown away or improperly disposed. A deposit/refund system could be managed either by the government or an industry-sponsored TPO under a legislatively-authorized system; the e-waste could either be sent directly to recyclers or returned to producers to process. It could incorporate incentives for DfR by varying the deposit and refund depending on how easy the product is to recycle, although this would complicate the administration of the program and increase transaction costs, particularly for collection centers.

Some people believe this would be an inappropriate model for electronics since electronics are held for years, as opposed to bottles and cans that are returned within weeks; the deposit might be too small compared to the total purchase price to provide an incentive to return it; and bottles and cans are a single material that can be reused almost directly whereas electronics are not. A deposit/refund model also requires a transaction at both the front-end and back-end, thus doubling the transaction costs. This system would require the mandatory participation of all electronic retailers to charge the deposit fee. Usually the return is made to the point-of-purchase in other deposit/refund systems, which would mean all electronic retailers might have to be collection centers and give refunds; but it is possible to encourage other collection centers and not mandate retailers as designated collection centers.

**Table 1: Examples of ARF charged in the United States and Europe (in Euros)<sup>62</sup>**

Country	ARF Range
The Netherlands	€3-8
Belgium	€0.1-9
Switzerland	€10-20
California (U.S.)	\$6-10

### *Advance Recovery Fees (ARF)*

A front-end fee, specifically an advance recovery fee or advance recycling fee (ARF)—sometimes called an advance disposal fee (ADF)—requires that the consumer pay a fee upfront at the point of purchase to fund a recycling program. An ARF is usually a visible fee separately listed underneath the sales price. It can be imposed and managed by the government, industry, and/or a TPO (given legislative authorization). The two greatest benefits claimed by ARF supporters are that 1) it provides an immediate, reliable, and sustainable source of funding for the entire recycling system and 2) it pays for the recycling of all returned products—including orphans—obviating the need to determine the brand ownership of returned products. The

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<sup>62</sup>Examples of ARFs are from 2003 or earlier.

concept is also touted as easy for consumers to grasp, and it can relieve the local recycling participation in the same manner as an EOL fee might. It is possible the fee may decrease over time, as the recycling market improves and unit costs decrease. According to some commentors, charging a fee at the point of sale also provides an educational opportunity for the consumer as well as for the sales representative to remind the consumer about proper recycling for both new and old products. A 2002 survey found that 71 percent of respondents would prefer that prepaid recycling costs be included in the retail cost of the product, as opposed to an EOL fee or mail back program. If a pre-paid recycling fee of \$15 were added to the cost of a television, 86 percent of respondents said they would still buy it.<sup>63</sup>

According to comments from the Electronic Manufacturers/Coalition for Responsible Recycling, an ARF-based recycling system provides for shared responsibility between manufacturers, government, retailers, recyclers, and the consumer. In this organization's vision, the manufacturers would manage the recycling system through a TPO, collect the fee on their own direct sales, and provide recycling information to customers through product literature and on web sites. Manufacturers would also improve product design by complying with the EU's RoHS Directive, participate in the creation of an environmental purchasing label, and assist recyclers with information on product features that affect end-of-life management. The Coalition document does not describe the responsibility of other stakeholders but clearly the consumer pays the ARF, thus directly financing the entire system. As proposed by this manufacturers' industry coalition, the retailers collect the bulk

#### **Collection Incentive Payment (CIP)**

Collection incentive payment (CIP) is a payment to organizations that provide a collection service in order to encourage them to collect e-waste. The concept was developed in the NEPSI process to develop a mechanism to encourage and finance collection activities through a front end financing system such as an ARF or producer responsibility. The CIP only pays for the cost of collection and perhaps shipment to a consolidator or recycler, but does not pay for processing or recycling the scrap. According to commentors, the CIP provides financial security at a minimum, if it covers the cost of collection, and a financial incentive, if the CIP exceeds collection costs. The concept developed through NEPSI was that collectors would be compensated with a CIP by the Third Party Organization or entity managing the overall national system from the front-end fees collected at the time of product purchase. To most effectively manage the CIP and to avoid complexities, bureaucracy and abuse, it was thought that the likely way a CIP would be administered would be through the processors contracted to process e-waste: the processors would be provided with a per pound pass-through to collectors to create an incentive for the collectors.

A CIP could increase the number and variety of collection points and allow greater flexibility for the wide variety of local communities to find the best solution. It releases local governments from unfunded mandates and retailers from mandated one-size-fits all solutions. It allows charities to aggressively collect electronics and cherry pick those items that can be profitably resold to support their programs. A number of comments received echoed the same recommendations that NEPSI had agreed to, which is that no entity should be required to provide collection, but a payment system should be established making it beneficial and desirable for many entities to do so: any entity that meets the standards set to provide collection services to customers should be eligible to receive the CIP.

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<sup>63</sup> Public Opinion Research on Electronics Recycling, SoundStats for Washington Citizens for Resource Conservation, August 2002, [www.prrbiz.com/WCRC\\_Report2.pdf](http://www.prrbiz.com/WCRC_Report2.pdf).

of the fees at the point of sale, and the retailers and the government may act as collection points, probably collecting a collection incentive payment (CIP) financed by the ARF. The recyclers receive a set amount per pound to recycle scrap, financed by the ARF.

Any ARF would have to be great enough in scope to fund recycling of all returned products (including orphans), making today's consumers fund recycling for historic products as well as present products. Perhaps more so than other financing systems an ARF also presents a potential problem with Internet sales. If the fee is not applied to all Internet sales, there is concern that consumers would abandon traditional retailers and mainly buy products online to avoid the fee. While few televisions are currently purchased online, a very high percentage of personal computers and peripherals are. In the 2002 survey mentioned above, however, only eight percent of respondents said they would buy over the Internet to avoid the fee.<sup>64</sup> California operates an ARF recycling system and believes it is capturing the fees on Internet sales.<sup>65</sup>

### Internet Sales and Foreign Producers

States cannot enforce compliance on companies that sell into their state over the Internet but do not have a nexus or physical presence in the state. States cannot enforce the collection of a fee on sellers, such as an advanced recovery fee, if the seller has no physical presence in the state but sells over the Internet. In California, the Board of Equalization issued an opinion in November 2004 on its website for the Electronic Waste Recycling Fee that says "Out-of-state sellers who are not required to hold a California seller's permit or are not obligated to collect California use tax are not presently required to collect the fee. Consumers who buy from those retailers owe the fee to the state. Out-of-state retailers who are not required to collect the fee may voluntarily register to collect the fee as a courtesy to their customers. That voluntary registration, by itself, does not make the retailer obligated to collect California use tax."<sup>66</sup> Given the growing number of electronic sales over the Internet, this could provide a significant loophole for companies to avoid paying the ARF. International Data Group (IDG) estimated that 21 percent of PC sales were over the Internet in the U.S. market in 2004. Of that amount, eight percent were "whitebox" sales or non-brand sales.<sup>67</sup>

Similarly, states can have difficulty enforcing various aspects of a recycling system, such as fees, membership in a TPO, or product design change on producers from outside the country. They can legislate that no product can be sold in their state unless the manufacturer meets certain requirements, but enforcement would present a challenge.

An ARF system as proposed by the Electronic Manufacturers/Coalition for Responsible Recycling makes participation by product sellers to collect the ARF mandatory, regardless of their size. Some retailers oppose an ARF at the point of sale. Retailers are concerned about administration of a fee, the customers' reaction to a fee, the need for sales people to explain a sliding scale fee on only some products, and the difficulty of enforcement to ensure that all retailers charge the fee beyond large national/regional chains. A variation of this ARF is proposed by Radio Shack which recommends a fee assessed on the manufacturer for all of its

<sup>64</sup> Public Opinion Research on Electronics Recycling, SoundStats for Washington Citizens for Resource Conservation, August 2002, [www.prrbiz.com/WCRC\\_Report2.pdf](http://www.prrbiz.com/WCRC_Report2.pdf).

<sup>65</sup> Interview with Matt McCarron, California Integrated Waste Management Board, June 14, 2006.

<sup>66</sup> California State Board of Equalization website [www.boe.ca.gov](http://www.boe.ca.gov) questions on electronic waste, referenced Publication 77, *Do You Need to Register in California? For Out-of-State Sellers*, November 2001, (November 2004).

<sup>67</sup> IDC, U.S. PC Tracker, Consumer PC Sales and the Internet Channel, March 2005.

covered products if full manufacturer responsibility is not an option: “A visible Advance Recovery Fee (“ARF”) at the point of sale to the consumer in reality offers no advantage over a fee on the manufacturer.” Radio Shack further states that a visible ARF at point of sale is a very distant second choice (Radio Shack’s emphasis), “ONLY IF a truly preemptive Federal solution is possible so that there is ONE rate nationwide on covered products and retailers are compensated for the costs of collecting and remitting. The single rate should be under \$10. ALL sellers should collect and remit on all sales to end users, whether Internet, catalog, brick & mortar, commercial, or consumer. No sales to end users whatsoever should be exempted from the fee.”<sup>68</sup>

An ARF system does not necessarily provide any incentive to producers to design for environment (DfE) or design for recycling (DfR). But incentives for DfR could be incorporated into the system via a partial refund or other form of reward for producers whose products cost less to recycle or demonstrate one or more other environmental benefits. This would require further administrative mechanisms. In the Electronic Manufacturers/Coalition for Responsible Recycling scenario, the design incentive is the RoHS mandate.

There are numerous ways an ARF could be incorporated into a recycling system. For example, in the California legislation, the ARF (called an “electronic waste recycling fee”) is used to finance the entire recycling system from collection through to recycling. Orphan products are included with all others in recycling. Under this system, the state government pays the recyclers directly. Critics of the California system argue that the producer has no real responsibility for recycling or any associated incentive to design for recycling. Critics also argue that this system may not provide much incentive to recyclers to bring costs down. California’s experience so far has been that the ARF does not cover the cost of recycling. California’s average ARF is \$8.00; eighty-seven percent of the covered devices fall into the size range for an \$8 ARF. The state pays the collectors/recyclers \$0.48 per pound. The weight of the average CRT is about 33-35 pounds, so the average per unit reimbursement to the recycler is \$16.00.<sup>69</sup> The state has the ability to adjust the fee and the payment rates in the future.

**Table 2: California Electronic Waste Recycling Fee<sup>70</sup>**

<b>CRT Screen Size</b>	<b>ARF</b>
Greater than 4” and less than 15”	\$6
Greater than or equal to 15”and less than 35”	\$8
Greater than or equal to 35”	\$10

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<sup>68</sup> Radio Shack comments in Appendix VII.

<sup>69</sup> California Integrated Waste Management Board, June 16, 2006.

<sup>70</sup> California Integrated Waste Management Board, see <http://www.ciwmb.ca.gov/Electronics/Act2003>, (21 June 2006).

Variations of an ARF-financed system abound. For example, an ARF could be collected and managed by a third party organization (TPO) representing the producers and used to finance the entire recycling system. In this instance, the consumers provide all the funds and the producers, while they manage the system through the TPO, would have no direct DfE or DfR or cost incentives without use of a sliding scale or legislative design mandates. Orphan products would be included with all others in recycling.

As another example, an ARF could be used to finance just the collection and transportation to a consolidator or recycler. The producers could have full responsibility for managing and financing the actual recycling and receive no portion of the ARF. Under this model, most of the ARF would be used to finance collection incentive payments (CIP) to encourage organizations to act as collection points and to reimburse collection points for their costs. It could be managed either by the government or by a TPO made up of producers. Producers would be responsible for the recycling so would have to decide among themselves how to split the e-waste recycling costs among members and how to finance the recycling of orphan products. Under the California system, the guaranteed payment of \$0.48 per pound to collectors/recyclers did incent new entrants to the market. In January 2005, California had 96 collectors and 20 recyclers. By June 2006, it had 410 collectors and 46 recyclers.<sup>71</sup>

Belgium is an example of a country with a TPO, called Recupel, that collects and recycles products on behalf of producers and importers. This system is viewed by many as successful because Recupel has achieved wide participation from producers and importers in the country, which consisted of 1,826 affiliations and 1,134 members in 2003.<sup>72</sup> Recupel has obtained this high participation because it invests heavily in monitoring and reporting and operates a register of companies dealing with electrical goods so that it can provide the names of noncompliant companies to the authorities.<sup>73</sup>

Regardless of how the fees from an ARF are disbursed, an ARF costs money to administer. Depending upon where the fee is assessed it may require a substantial administrative mechanism and organization for fee collection and disbursement. Critics argue that bureaucracies do not often lower costs, nor do monopolies—and there are no incentives to producers to DfR or DfE. But competition and incentives could be built into the system in other ways. For example, California chose to effect DfE not through economic incentives, but by banning the use of certain materials consistent with the European RoHS and requiring manufacturers to submit annual reports on design efforts and their use of hazardous materials. It is possible to bring down recycling costs if competition is introduced to the system. HP's comments gave an example of the German Packaging Take Back system, a producer-financed system known as the German Green Dot System that was a monopoly before the summer of 2001. When it introduced competition, the cost of participation decreased by 30 percent. Additional changes to internal administration led to a further lowering of costs to the participants.

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<sup>71</sup> California Integrated Waste Management Board, June 16, 2006.

<sup>72</sup> Recupel, *Annual Report 2003*, Brussels, Belgium 2003, p. 7, <http://www.recupel.be/recupel/pdf/annualreport2003.pdf>.

<sup>73</sup> UK Department of Trade and Industry, *Study into European WEEE Schemes*, November 20, 2003, p. 56.



Finally, implementing an ARF on a national level would require Federal legislation and the willingness of Congress to enact a national fee ultimately paid for by consumers.

*Producer Responsibility and Cost Internalization*

The term "extended producer responsibility" (EPR) was coined in the early 1990s to mean the extension of the responsibility of producers for the environmental impacts of their products to the entire product life cycle, and especially for their take-back, recycling, and disposal. EPR and "producer responsibility" are often used interchangeably. In 1996, the President's Council on Sustainable Development recommended an EPR policy which it defined much more broadly as the shared responsibility of government, consumers, and all industry actors in the product chain for all the environmental impacts of a product over its life cycle, with no emphasis on the producer's unique responsibilities or on the post-consumer stage. In practice, the term has mostly been used to describe producer responsibility "post-consumer"—after products have been discarded at the end of their useful life. As such, EPR shifts the responsibility for discarded materials that would otherwise be managed by local government to private industry, thereby incorporating the costs of product disposal or recycling into the product price of new products.<sup>74</sup>

Under the EPR model, producers can take individual responsibility or work together in groups by forming a single TPO or multiple TPOs to recover their own products—or at least their own share of products—and manage the system. Under the full cost internalization (CI) variant of producer responsibility, producers are responsible for all costs for collecting and managing recovered products. Each manufacturer can decide individually how to absorb the additional costs, including passing part or all of the costs on to the consumer. NEPSI also discussed a variant called Partial Cost Internalization (PCI), which refers to a system where the producers are responsible for some level of consolidation, and all processing and recycling, and the government is responsible for collection.

CI and PCI differ from the ARF in a number of ways. Unlike many ARF varieties, there is no visible and separate fee to the consumer. The retailers do not need to create an infrastructure to collect and remit an ARF at point of sale, thus there is no fee collection bureaucracy. Depending on how the EPR/CI system is established there could be fewer transactions, thus lowering transaction costs. Individual companies and/or the industry TPO might have a material tracking and reporting requirement to demonstrate compliance with government producer responsibility mandates. Administratively, EPR/CI supporters claim that the producer responsibility model should be simpler, although critics note the additional requirements associated with orphan determination and responsibility allocation.

Other major arguments made by EPR/CI supporters are that this financing mechanism provides 1) incentives for development of a competitive recycling industry, 2) design for recycling, 3) the least cost for consumers and local governments, and 4) flexibility for creating a variety of collection systems depending upon what works best for industry, retailers, and government in each locale.

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<sup>74</sup> Bette K. Fishbein, *EPR What does it Mean? Where is it Headed?*, P2 Pollution Prevention Review Vol. 8 1998, <http://www.mindfully.org/Sustainability/EPR-Extended-Producer-Responsibility.htm>, 17 February 2005.

State and local governments working with the Product Stewardship Institute selected producer responsibility as the preferred system for state legislation. Under this financing framework the costs of recycling would be borne by the producers and users of the electronics: the producers would manage and finance the system and the consumer would pay whatever costs were passed through to the product price (although not necessarily at identical amounts from company to company as in the ARF system). The attempted NEPSI compromise describes a transition from ARF to producer responsibility after seven years. The EPR Working Group's website<sup>75</sup> and the Computer TakeBack Campaign website,<sup>76</sup> have guidelines for a national EPR program that were referenced by a number of commentators.

One of the arguments made in support of the EPR model is that it incorporates the most direct incentives for changing the design of the product. The theory is that if companies must recycle their own products—and can devise a system to actually recover their own products—they will design them to be easier, and therefore cheaper, to recycle. DfR incentives, arguably, work most directly if the manufacturer must pay to process its own product and not that of other companies; in addition, the cost must be high enough to create an incentive for change. A typical recycling financing system based on producer responsibility charges individual producers according to a formula based on brand share of the e-waste collected plus a proportionate share of the orphan products. Alternatively a producer responsibility system might be based on a firm's present market share. This "share" approach provides for administrative efficiencies and handling efficiencies, but limits the direct linkage to DfR since the recycling benefits for any particular brand are spread across all parties recycling e-waste.

For example, the Maine system contains several EPR-like elements in which a producer could receive back its own used product, at an additional cost, if the consolidator sorted product by brand and returned it to the producers. Independent of the financing method, some recycling programs establish goals for collected e-waste per capita by weight, with a higher number each year leaving open the possibility for how this is accomplished. Theoretically, producers with responsibility to collect the return of their own products might well become creative with incentives to various parties to collect the used product, as well as direct incentives to consumers to return the used product. EPR supporters argue that even in the "share" approach where the producer is given a target to reach, a producer could actively seek back its used products through incentives to collectors, incentives to consumers, or other innovative methods. In this case, once re-acquired, the producer could actually reuse, refurbish, and recycle its own product, or pay a contractor to do it, thus arguably having a very direct incentive to change the design of a product to lower the costs of recycling. The WEEE Directive allows companies flexibility to create their own collection and recycling systems for new products, while at the same time making them responsible for historic and orphan products.

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<sup>75</sup> See [www.eprworkinggroup.org](http://www.eprworkinggroup.org).

<sup>76</sup> See [www.computertakeback.com](http://www.computertakeback.com).



At least one large computer manufacturer in its comments championed producer responsibility as the better financing system and said that companies should be responsible for their own product recycling.<sup>77</sup> Companies' direct recycling of their own products, however, requires very labor intensive sorting and additional transportation costs to the individual producers or could even require a targeted and resource-intensive campaign by each producer to reach consumers directly. As mentioned before, the number of brands in electronics is very high. In addition to the Florida study cited earlier, a study in Hennepin County, Minnesota, identified 282 brands of televisions, 458 brands of computer monitors and 481 brands of CPUs that were collected from households in a six-month period in 2004.<sup>78</sup> The study documented the complexities of brand sorting. It found that 30 to 60 minutes of extra time per delivery was required to record the brand names at a cost of \$0.35 per unit, not including data entry, data analysis, and project management costs.

Most producers are not in the recycling business at this time and many do not want their product back. HP, however, has two electronics recycling facilities in the United States, as does Sony.<sup>79</sup> IBM has also operated two recycling facilities in the United States since the early 1990s, and Dell has recently ramped up electronics collection and recycling activities. Theoretically, it may become economically feasible in the future to sort products by brand prior to the recycling process. Clean Production Action commented, "It is crucial that individual brand name companies be allowed to decrease their costs through design change or through creating alliances with other companies to collectively set up a system to handle their own brand name products. Companies know that Radio Frequency Identification will be the common form of product ID within the next few years allowing automatic identification of product brand name owners to quickly identify their products when collected. For this reason it is imperative that the system be run by industry; not by the government, if such flexibility and opportunity for cost effectiveness through a competitive system is to occur."

**Largest PC Vendors in U.S. Market**

Dell (33%)  
HP (20%)  
Gateway (5%)  
IBM (5%)  
Toshiba (4%)  
Others (32%)

Source: IDC 3rd quarter 2004

A more common scenario is that the producer's responsibility is limited to paying its share of returned products plus a share of orphan products with all brands handled together. The producer never sees its scrap. If one brand is easier to recycle than another, it is not clear that

<sup>77</sup> HP comments in Appendix VII.

<sup>78</sup> Department of Environmental Services, *The Hennepin County Consumer Electronics Brand Tally*, January 2005, <http://www.hennepin.us>, January 25, 2005.

<sup>79</sup> Sony leases space to private recyclers at its Pittsburgh and San Diego facilities who recycle Sony and other products. Interview with Sony Washington Office June 15, 2006.

a recycler's cost would be lower since the unsorted e-waste would all have to be treated the same and broken down together. Opponents of EPR argue that this scenario offers little incentive to companies to design for the ease of recycling unless redesign is done equally by all members of the consortia. EPR supporters counter that producers working together could theoretically institute design changes to all brands that could make future e-waste less expensive to recycle.

For example, in the Netherlands, the information and communications technologies (ICT) Milieu system, which covers ICT equipment, is a TPO that manages and finances the recycling system. Under ICT Milieu there is a fixed annual fee for membership in the system as well as a variable cost dependent upon current market share. A company's total percentage of the weight per category is the basis for calculating a distribution factor and each month participating organizations pay a share in the disposal costs. These fees include costs for the disposal of orphaned and free rider goods and companies must absorb the costs of participation or pass them on through the retail supply chain.<sup>80</sup> The TPO-managed system, with costs based on current market share, replaced an earlier system of financing which was an 'own brand' financing system based on return share. According to ICT Milieu, members complained about this original financing system because of a very high level of free rider and orphan products—estimated at 44 percent—parallel imports, a lack of transparency, and the high costs of brand sorting.<sup>81</sup>

According to some, the EPR model could result in less administrative costs. One of the reasons is that a fee-based system, whether administered by the government or the industry, requires the creation of substantial infrastructure. Every layer added to the administration of the system increases the transaction, handling, and administrative costs.

In California, the only state now implementing a statewide ARF, overhead costs on the part of the state government are estimated to be approximately 18 percent of the \$73 million collected in the first year, in addition to the three percent of the ARF that retailers retain.<sup>82</sup> In the Maine system discussed more below, producers receive invoices from state-approved consolidators based on actual return counts plus an orphan share; these consolidators incur administrative costs for billing manufacturers and include this cost in their producer invoices.

Beyond administrative costs, HP included in its comments an evaluation of the costs of three different systems operating in various countries—a government imposed fee, collective industry implementation, and individual producer responsibility—based on its experiences in those countries, and concluded that systems using fees at the point of sale “are less efficient, less competitive in the provision of recycling and so result in a more costly system for

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<sup>80</sup> Department of Trade and Industry, *Study into European WEEE Schemes*, pp. 67-68.

<sup>81</sup> Department of Trade and Industry, *Study into European WEEE Schemes*, p. 73.

<sup>82</sup> Interview with Matt McCarron, California Integrated Waste Management Board, June 14, 2006.

consumers...” while reporting that the costs of the individual producer responsibility model had substantially lower costs overall.<sup>83</sup>

**Table 3: HP’s Product Takeback Cost Estimates under Different Financing Systems<sup>84</sup>**

<b>Financing Mechanism</b>	<b>Government Fee</b>	<b>Collective Industry Implementation</b>	<b>Individual Producer Responsibility</b>
Cost per unit sold (estimated range)	\$8.50 – 10.50	\$8.60-16.00	\$2.40-4.50

Critics counter that many of the same administrative costs remain under an EPR/CI system. For example, where producers are responsible for collecting the used product, producers or their TPO may make arrangements with local governments, retailers, and/or other organizations to act to collectors. These arrangements might include reimbursements or incentive payments. The producers (or the TPO) contract for transportation and recycling services. Producers can decide amongst themselves whether to process the goods collectively or to incur the extra cost to sort them by brand and return them to the original producer.

Orphan products are identified and treated differently in an EPR/CI system based on returns or return share. Whereas under the ARF in which orphan products are taken care of automatically with all other products, under EPR/CI producers must decide how to process orphan products and who will pay for them. There are companies that once sold a considerable amount of televisions and personal computers in the United States that are either no longer in business or no longer sell those products. Under an EPR/CI model based on returns, these companies do not pay; instead today’s producers must pay for recycling these products. Decisions must be made on how much each producer pays into a TPO and, if products are to be sorted by brand and returned to manufacturers, how orphan products will be distributed or financed. If costs are allocated based on brand share in the waste stream (i.e., on returns), brands must be counted at least on a sample basis. Opponents of EPR/CI argue that the government-run ARF avoids the need for these administrative tasks and decisions, and possibly time-consuming debates. Under Maine’s law, invoices submitted to manufacturers are based on the actual weight of their returned brands plus a state-determined pro-rata share of all orphan products returned to that consolidator. Maine consolidators are also collecting brand count information for possible use in determining orphan pro-rata shares beginning in 2007. California, under the ARF system, does not do any brand sorts or brand identifications.

Another concern expressed about EPR/CI is the possibility of unfairly higher costs for some manufacturers than for others. For example, commenters noted that if EPR/CI responsibility is based on current market share then companies that have the largest present market share would have to absorb the highest percent of recycling costs and largest percent of orphan products, increasing their costs, thus lessening the competitiveness of their product. Others

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<sup>83</sup> HP’s comments in Appendix VII. These numbers were not independently verified by the U.S. Department of Commerce.

<sup>84</sup> HP supplemental comments in Appendix VII.

noted that if EPR/CI responsibility is based on a brand's share of returns in the waste stream, then new entrants to the market would have the lowest or no historic return share and, therefore, the lowest recycling costs and thus an immediate competitive advantage. This is particularly a concern in the television industry where the televisions in the waste stream are much older than other consumer products (e.g., 15-17 years). A national ARF would raise the cost of each company's products the same amount, regardless of market size and at which point in time they entered the market.

Top TV Vendors in the United States	
	Sony
	RCA
	Sanyo
	Panasonic
	Toshiba
	Apex
	Sylvania
	Magnavox
	Sharp
	Philips
	Samsung
Source: Panasonic 2004	

Commentors addressed whether producers should be allowed to opt out of a TPO or similar mandated unified system. Some were emphatically against an opt out provision. In battery recycling, some manufacturers opt out of the RBRC program in favor of recycling programs they provide on their own; some in the RBRC contend that these laws are usually ineffective and that many self-regulating recycling programs that companies operate are, in reality, not nearly as strong in reality as they are on paper.

Finally, some critics feel that the EPR/CI does not embrace the concept of shared responsibility and provides no consumer education about the importance of recycling, whereas the ARF both educates the consumer and makes them pay directly for the recycling system.

### *Real Life Examples—Hybrids*

In practice, many programs in place today are a variation of these financing models or a hybrid of several different financing models. The many possibilities for variations of the models are not fully discussed in this report. Each financing model has fairness, administration, and enforcement issues, as well as design feedback and other considerations that can be adjusted to address the concerns raised by critics. Some adjustments can add to the complexity of the system, making administration more difficult.

The EU's WEEE Directive is one form of a hybrid with an emphasis on producer responsibility: the system is based on producer responsibility but allows an ARF for some period of time. Furthermore, as country-specific WEEE implementation moves forward in

2006, additional variations of this hybrid have appeared, including country-specific regulations that allow the ARF in some countries, mandate it in several others and prohibit the ARF in one (Greece). By and large, the WEEE Directive requires importers and manufacturers to finance the collection, reuse, and recycling of appliances. For products introduced to the market after 2005, producers generally have an individual responsibility to fund the management of their own products. However, across all countries, manufacturers are allowed to impose a “visible fee” on the product to cover the cost of WEEE compliance for 8-10 years, which is an ARF managed by the producer. The visible fees paid in the European programs are paid by the original equipment manufacturer (OEM), rather than by the retailer, directly to the producer responsibility organization. The fee is then managed through the sales chain and is usually visible to the consumer at the point of sale. NEPSI considered a different model consisting of retailers charging an ARF for the first few years, then phasing out the ARF and moving to a CI model.

The reasons supporters give for starting a recycling system with an ARF is that it provides adequate financing to clear out the historic waste and helps stimulate more rapid development of a collection, transportation, and processing infrastructure by ensuring funding, such as paying a CIP to the collection points to ensure adequate collection. The ARF finances the system while the recycling infrastructure and the market for recycled materials matures.

In the Netherlands, the ICT Milieu recycling system was initially financed by a fixed annual fee to producers and importers plus a charge per kilo of equipment taken back and processed, according to brand. But because of problems already mentioned, such as expensive brand sorting and a very high level of free rider and orphan products, the ICT Milieu changed its financing system to a fixed annual fee to producers and importers, along with a variable cost dependent upon current market share.

Maine’s legislation is based on producer responsibility, but it is also a hybrid. Municipalities are responsible for collection and delivery to a consolidator, at which point the producers’ financial responsibilities begin. Alberta’s Beverage Container Recycling Program is a deposit/refund model. The program was not taking in enough money to finance the system and added an ARF in 2002 to pay for recycling.

### **Incentives for Voluntary Industry Recycling**

While many of the recycling programs in the various products and countries highlighted in this report have resulted from government legislation or have been in the shadow of impending government legislation, much has been voluntary. In the United States, most of the recycling or product stewardship efforts undertaken in e-waste up until this point have been voluntary. The NEPSI dialogue was a voluntary effort by industry and other stakeholders to find a solution to nationwide e-recycling. Several manufacturers have also opened recycling facilities, such as HP and Sony. Manufacturers and retailers have sponsored take back programs either as one-day or limited time events, a number of which are included in this report under ‘Government and Industry Activities.’ This same section discusses a diversity of methods to encourage voluntary product stewardship that industry and

government have been developing together, such as awards, green product rating tools, and leveraging the Federal procurement system.

Tax incentives are another tool to encourage product stewardship. Some legislation has focused on tax incentives. The Consumer Electronics Association took a cursory look at tax incentives in a 2003 report.<sup>85</sup> It recommended considering:

- Tax incentive for businesses collecting electronic waste based on volume of electronics collected and number of full-time jobs created.
- Tax incentive for businesses processing electronic waste based on volume processed and number of full-time jobs created.
- Tax incentive for businesses managing take-back programs based on volume collected and number of full-time jobs created.
- Tax incentive for manufacturers utilizing recycled electronics materials in new electronics products.

A 1998 assessment of tax incentive programs adopted by state governments to spur recycling gave mixed reviews to the effectiveness of the tax credit programs in 22 states.<sup>86</sup> The author found that some states had abandoned tax credits because of the cost and hypothesized that states might be moving toward loans and grants because of the expense of financing recycling programs through tax incentives. A review conducted by two California state agencies of 1995 California's tax credit program, which ended in 1996, found that it was very difficult to determine whether the credit actually promoted recycling. The review suggested restricting tax credits to emerging recycling markets. However, tax credits cannot help start-up businesses in new markets that do not show a profit initially. Oregon changed the target of its tax credit from recycling collectors to businesses using recovered materials in the manufacture of new products in order to spur the creation of new markets for recovered materials. The author found that states that had the most success with tax incentives were those that also provided a network of market development assistance in the form of technical assistance or financial assistance in addition to tax credits, such as loans or grants.

### **Creating a Market for Recycled Goods**

Whether electronics recycling can ever be profitable and market driven without the payment of additional recycling fees revolves around how much demand there is for the resulting recycled materials and whether the recycled material can compete on cost with the original manufactured material. Creating a market for the recycled product at a competitive price has been a problem in a number of industries. For example, Saskatchewan had an over 80 percent recycle rate of the annual sale of tires and uses the recycled tires to make astroturf, mats, shingles, car ramps, patio bricks, belts and swings, but the industry was still supported by a

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<sup>85</sup> Douglas Johnson, *Electronics Recycling: Incentives, Not Mandates*, Consumer Electronics Association, June 3, 2003 Draft.

<sup>86</sup> Kathern Sparks, "Tax Credits: An Incentive for Recycling?" *Resource Recycling*, July 1998, <http://www.epa.gov/jtr/docs/taxcred.pdf> (April 2005), also see summary of state recycling tax incentives at [www.epa.gov/jtr/bizasst/rec-tax.htm](http://www.epa.gov/jtr/bizasst/rec-tax.htm) (April 2005).

disposal fee. Quebec's used paint program was trying to create a market for reprocessed paint under the name "Boomerang." An ARF was supporting this recycling program.

U.S. carpet manufacturers signed a voluntary Memorandum of Understanding for Carpet Stewardship in 2002 with a target to divert 40 percent of the carpet bound for landfills to other uses or recycling by 2012. The problem was that some carpet types cost more to recycle than to landfill and there was no current demand for a product made from recycled carpet, so a market solution was not possible at that time. Demand for products made with recycled content carpet is beginning to develop, but slowly. Some industry representatives believe rather than considering mandates that the carpet industry recycle, in order to create a market-driven industry, the government could encourage a market-driven industry through mandates or incentives to use recycled carpet in other products.

Mandating or encouraging through incentives a certain percentage of recycled content in new products is one action government may take to try to create a market for recycled goods. Panasonic suggested government tax credits for the use of post-consumer materials. Other stakeholders suggest that Government encourage the market for recycled goods through encouraging labeling that informs the consumer of the amount of recycled content or using the Federal procurement process to favor goods with a higher percentage of recycled content.



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# APPENDICES

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## APPENDIX I

### INTERNATIONAL LAWS, TREATIES, AND ACTIVITIES

The following descriptions of laws and treaties are included to show the level of international activity affecting electronics recycling. The descriptions of activities in various countries are not meant to be inclusive, but instead provide examples of the many different real world models that exist for financing electronics recycling. Many of the countries in the EU are in the midst of transitioning their electronics recycling program to comply with the EU WEEE and RoHS directives.<sup>87</sup> While most of the research on country specific electronics recycling programs is taken from 2004 reports, and many of the programs described here may have been modified, the program descriptions still remains informative as a comparison of different financing systems.

#### **European Union Waste from Electrical and Electronic Equipment (WEEE) Directive**

##### *Overview*

The European Union (EU) Waste of Electrical and Electronic Equipment (WEEE) Directive required that Member States ensure that collection and treatment centers are in place and that manufacturers have set up financing systems to pay for collection and treatment of this waste by August 2005. EU Member States were due to implement the WEEE Directive in August 2004 but only one country<sup>88</sup> met the deadline. Other Member States postponed implementation. The Directive is based upon the principle of producer responsibility. The Directive requires producers to finance their collection, treatment, recovery and disposal of the wastes either by setting up their own center or by paying a fee to join a collective scheme, which would probably be run by a municipality. Also, producers must mark electric equipment with the symbol of a wheeled trash bin with an “x” through it after August 2005 to ensure that the waste from this equipment goes to the proper WEEE collection and treatment center and not to the municipal garbage. One of the goals of the directive is to encourage the design and production of electrical equipment that will facilitate repair, upgrading, reuse, disassembly, and recycling.

##### *Scope*

The WEEE directive applies to the following ten categories of products:

1. Large household appliances (washing machines, stoves, refrigerators, etc.)
2. Automatic dispensers (appliances that deliver products such as warm beverages)
3. Consumer equipment (televisions, stereos, radios, etc.)
4. Sports and leisure equipment, toys (video games, model trains, etc.)
5. Small household appliances (hair dryers, toasters, vacuum cleaners, etc.)

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<sup>87</sup> Perchards, *Transposition of the WEEE and RoHS Directives in Other EU Member States*, July 2005, [http://www.dti.gov.uk/sustainability/weee/Perchardsreport\\_July05.pdf](http://www.dti.gov.uk/sustainability/weee/Perchardsreport_July05.pdf) (April 14, 2006).

<sup>88</sup> Cyprus.

6. Information and telecommunications equipment (computers and peripherals, calculators, cellular phones, etc.)
7. Monitoring instruments (control panels, thermostats, smoke detection devices, etc.)
8. Lighting (sodium lamps, fluorescent lamps, etc.)
9. Medical devices (radiology equipment, ventilators, etc.)
10. Electrical and electronic tools (sewing machines, drills, saws, etc.)<sup>89</sup>

The WEEE Directive sets a minimum standard and its Member States can choose whether to follow this minimum standard or to apply more strict policies in their respective countries.<sup>90</sup>

Under WEEE, the financing systems are to be determined at the community level. Financing schemes for household WEEE must be based on producer responsibility and must contribute to high collection rates. Member States are required to ensure that each producer provides a guarantee when placing a product on the market showing that the management of all WEEE will be financed and that the product is clearly marked. In regards to new products, or those introduced to the market after August 13, 2005, producers have an ‘individual responsibility,’ which means that they must fund the management of their own products. This can be done either through individual company programs or collective schemes involving multiple companies. The minimal quota for the collection is four kilograms per citizen/year. For re-use and recycling minimal quotas, they will be between 50 and 80 percent, depending on the appliance. Regarding orphan or historic products sold before the Directive applied, all existing manufacturers are responsible for these products in proportion to their market share by type of equipment. During a transitional period of eight years (ten years for large household appliances), producers are allowed to impose a separate ‘visible fee’ on the sale of new products to show the costs of collection, treatment and disposal. After the transitional period, these costs cannot be shown separately to consumers.

The rules are somewhat different for WEEE from commercial users. While producers are responsible for financing the costs collection, treatment, recovery, and disposal of WEE on new products, the Member States can allow that commercial (non-household) users be made partly or totally responsible for financing the management of historic waste.<sup>91</sup>

### *Impact*

The WEEE Directive applies to producers and distributors, and therefore will apply to U.S. exporters of electrical and electronic equipment (EEE) to the EU. Companies are concerned about the heavy costs the Directive imposes on them and the lack of clarity of the details of implementation, since the program was late in being implemented in most Member States. The UK, France and Italy still had not opened registration centers for the WEEE Directive as of May 2006. Several other Member States had only recently opened registration centers.

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<sup>89</sup> Inform, Inc. *European Union (EU) Electrical and Electronic Product Directives: WEEE and RoHS* p. 1.

<sup>90</sup> Inform, *European Union (EU) Electrical and Electronic Product Directives: WEEE and RoHS* p. 1.

<sup>91</sup> Official Journal of the European Union, Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE), 13.2.2003.

Another unknown is how Internet sales will be treated. The Directive defines whoever produces or imports equipment into a Member State on a commercial basis is regarded as the ‘producer’ and thus is responsible for collection, re-use, and recycling. It is not clear who will take this responsibility for Internet sales. Furthermore, one of the stated purposes of the WEEE and RoHS Directives is to harmonize individual Member State legislation on the management of electronic and electrical equipment. While passing the directives at the EU level would, in theory, unify the differing national requirements, there is some question as to what extent harmonization will indeed be ensured in practice. This is because the EU Commission has based the WEEE Directive on Article 175(1) of the EC Treaty (which is the legal basis for a majority of the EU’s environmental legislation), while the RoHS Directive is based on Article 95(1) of the EC Treaty (the EU’s legal basis for Internal Market legislation).

The legal basis of the directives is very important for industry since it determines under which conditions Member States may adopt legislation that goes further than the restrictions and obligations provided by EU legislation. Article 95(1) requires the Commission’s prior approval if Member States want to introduce stricter legislation. That means that all of the 25 Member States must implement the RoHS Directive as it is prescribed by the EC. Only with prior parliamentary consent can countries adopt stricter regulations. The WEEE Directive, on the other hand, does not guarantee harmonization because Member States may introduce stricter legislation subject only to notification of the EC.<sup>92</sup>

## **European Union Restriction of Hazardous Substances (RoHS) Directive**

### *Overview*

Recognizing that not all hazardous substances can be recycled or disposed of in an environmentally sound and safe manner, in 2003 the EU created Directive 2002/95/EC, the Restriction on Hazardous Substances (RoHS) Directive, which imposes a ban on the use of certain hazardous substances in electronic and electrical equipment. Like the WEEE Directive, Member States were required to implement the RoHS Directive by August 13, 2004, but final details on the implementation of RoHS depend on decisions taken by the Technical Adaptation Committee (TAC), which last met on February 2006. The RoHS directive provides that as of July 1, 2006, new electrical and electronic equipment put on the EU market must not contain lead, mercury, cadmium, hexavalent chromium, or the flame-retardants PBB and PBDE. The legal basis for the RoHS directive is the removal of trade barriers. Under RoHS, Member States may not apply more restrictive policies, such as requiring the removal of non-RoHS addressed hazardous substances or requiring removal sooner than the date set out in the Directive, unless these countries have an explicit exemption.<sup>93</sup>

In the past few years, the European Union and some of its member countries have taken a very active role in pushing to ban a number of products containing various nonferrous metals using “precautionary and substitution” principles. These proposals were initially focused on

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<sup>92</sup> EPA.

<sup>93</sup> Inform, *European Union (EU) Electrical and Electronic Product Directives: WEEE and RoHS* p. 1.



cadmium, lead, and mercury, but, recently, other metals such as copper, nickel, and zinc have been highlighted. The RoHS Directive establishes a regulatory process of placing bans on the use of certain materials, such as lead and cadmium, which are essential to the functionality, safety, and reliability of electrical and electronic products. In their evaluation of the new Directive, EU Commissioners have agreed that bans must be made based on risk assessments. The TAC is working to decide whether there should be additional exemptions listed in the RoHS directive. The European Commission will propose a review the terms of the Directive in 2008/2009 to take into account problems experiences in the first few years of operations of the new system.

### *Scope*

After July 1, 2006, most producers will have to ensure sure that products are not placed on the EU market if they contain the following substances:

- Lead
- Mercury
- Hexavalent chromium
- Cadmium
- Polybrominated biphenyls (PBBs)
- Polybrominated diphenyl ethers (PBDEs)

The elimination of these materials by this date will entail significant planning for producers because as of 2008 these hazardous substances in electrical and electronic equipment cannot be used any longer. This requirement will be phased in between 2006 and 2008.

RoHS covers the same scope as the WEEE Directive, with the exception of medical, monitoring and control equipment and a number of specific exemptions set out in the Annex to the Directive. The applications which are exempt from the requirements of the Directive include mercury in certain types of fluorescent lamps, lead in the glass of cathode ray tubes, electronic components and fluorescent tubes, lead in electronic ceramic parts, and hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators. The exemptions will be reviewed every four years.

### *Impact*

The RoHS Directive has already had a wide impact on product design internationally as EU and multinational electronics companies strive to comply with its requirements. The Directive is expected to have an impact on both U.S. and European industries as changes are being made up and down the supply chain. Companies have, and continue to make, enormous investments to find substitutes for banned materials and to develop tests to ensure compliance. Industry is, however, concerned that the proposals lacked transparency in their development and may adversely affect trade in products where viable substitutes may not exist. Furthermore, the EU might make further exemptions for chemicals where there are no known substitutes. The lack of substitutes for many uses of the regulated substances mutes the effect of RoHS. For example, the largest source of the restricted substances in electronics is lead in CRTs, which are exempt.

## **Basel Convention**

The 1989 “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal” was negotiated under the United Nations Environment Programme (UNEP). It entered into force on May 5, 1992 and currently has 168 Parties to the Convention. This multilateral environmental agreement regulates the import and export of hazardous waste among the Parties to it, and establishes legal obligations to ensure that such wastes are managed in an environmentally sound manner.<sup>94</sup> The Convention aims to minimize the generation of hazardous wastes in terms of quantity and hazardousness, to dispose of wastes as close as possible to the source of generation, and to reduce the movement of hazardous wastes. Hazardous wastes span multiple categories such as toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious to include anything from pathological waste to wastes from dyes/paints. The Basel Convention has established regional centers for training and technology transfer in Argentina, China, Egypt, El Salvador, India, Indonesia, Nigeria, Senegal, Slovak Republic, South Africa, Russian Federation, Trinidad & Tobago, and Uruguay. These centers are intended to help countries to implement the Basel Convention, through guidance and technical advising, and the centers also encourage countries to introduce cleaner production technologies and to use environmentally sound management practices.<sup>95</sup>

Parties to the Basel Convention must comply with basic notification and consent procedures and a requirement that each year Parties to the Convention must report information on the generation and movement of hazardous wastes. This information is collected via a questionnaire sent to member countries, requesting information on the generation, export, and import of hazardous wastes and other wastes covered under the Convention.<sup>96</sup> In addition, before an export of Basel-regulated hazardous waste can take place, the Parties to the movement must ensure that the waste will be managed in an environmentally sound manner in the country of import. Each transboundary shipment of hazardous waste or other waste must have a movement document along with it from the point its transit begins until its point of disposal. Under the Convention, waste shipments made without such documentation are illegal. To assist in these efforts, the Parties have developed guidelines on environmentally sound management of certain waste streams, waste treatment and waste management practices, along with guidelines on monitoring and detecting illegal traffic in hazardous waste. The Secretariat of the Basel Convention also assists countries (as well as industry, companies, and other stakeholders) to manage or dispose of their wastes in the proper way, and it cooperates with national authorities to develop national legislation, and to set up inventories of hazardous wastes, among other activities.<sup>97</sup> The Convention is not exact on what e-waste is considered hazardous. Basel parties interpret their obligations under the Convention using their domestic

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<sup>94</sup> U.S. Environmental Protection Agency. “Basel Convention Background.” International Waste Activities: Basel Convention Website, <http://www.epa.gov/osw/internat/basel.htm>.

<sup>95</sup> Secretariat of the Basel Convention. “Basel Basics: An Overview” website, <http://www.basel.int/pub/basics.html>.

<sup>96</sup> Secretariat of the Basel Convention.

<sup>97</sup> Secretariat of the Basel Convention.

laws. As a result, different countries have different views about which e-waste materials are hazardous under the Convention.

The United States signed the Convention in 1990 and the U.S. Senate provided its advice and consent to ratification in 1992. However, the Convention has not yet been ratified by the U.S. Government, as domestic legislation must be enacted that would provide statutory authority to implement all of the Convention's requirements. The United States participates in the meetings of the Convention Parties, but as a non-Party is not allowed to vote.<sup>98</sup>

### **World Trade Organization**

The World Trade Organization Doha Development Round Non-Agricultural Market Access Negotiations (NAMA) include talks on the elimination of barriers to trade of remanufactured and refurbished products, including electronics.

### **3Rs Initiative**

At the G8<sup>99</sup> Summit in June 2004 in Sea Island, the 3Rs Initiative<sup>100</sup> (Reduce, Reuse and Recycle) was introduced by Japan and supported by the United States to encourage mutual benefits for the environment, the economy, and jobs. Japan hosted a Ministerial Conference on the 3Rs Initiative April 27-30, 2005 in Tokyo to develop overall directions for the Initiative to encourage more efficient and effective use of resources and materials globally. The Government of Japan invited ministers from 19 countries, the EC Commissioner for Environment and representatives from several organizations.

As agreed at Sea Island, the Ministerial Conference addressed the following subjects:

1. National policies to implement the 3Rs
2. Reduction of barriers to the international flow of goods and materials related to the 3Rs
3. Encouragement of cooperation among various stakeholders
4. Promotion of science and technology suitable for 3Rs
5. Cooperation between developed and developing countries

Senior officials of 20 countries met in March 2006 in Tokyo as part of the Asia Pacific Forum for Environment and Development (APFED) Expert Meeting on the 3Rs to discuss relevant progress made in promoting “Reduce, Reuse and Recycle” domestically, to learn from other delegations about ongoing work in the promotion of the 3Rs and to determine

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<sup>98</sup> U.S. Environmental Protection Agency, *International Waste Activities*, Basel Convention Website, <http://www.epa.gov/epaoswer/osw/internat/basel.htm>.

<sup>99</sup> Group of the eight major industrial nations consisting of Japan, Russia, UK, France, Italy, Germany, USA, and Canada.

<sup>100</sup> See <http://www.env.go.jp/earth/3r/en/index.html> for more information.

ways in which barriers to transboundary movement of 3R products, particularly recycled and remanufactured, could be eliminated among participating countries.

## **Japan**

*(Producer-managed ARF, retailer and government collection)*

The Japanese government has passed a number of laws to promote recycling within Japan. In 2000, Japan enacted the Basic Law for Promotion of a Recycle-Oriented Society (Law No. 110) which sets basic principles relating to the creation of a recycle oriented society. The Law for Promotion of Effective Utilization of Resources (Law No. 48) enacted in 1991, and amended in 2002, sets recycling requirements for a wide range of different products. Several recent laws target recycling regimes in certain industries, such as the Specific Law for Container and Packaging Recycling, the Specific Household Appliance Recycling Law, the Construction Materials Recycling Law, the Food Waste Recycling Law, and most recently, and the Law for the Recycling of End of Life Vehicles.<sup>101</sup> Given the influence of Japanese companies on the global electronics market, the response of Japanese producers to these regulations by setting goals to produce products that use less energy, are more easily recyclable and contain fewer hazardous substances, has affected the make up of products by its global suppliers.

Under Japan's Specified Home Appliance Recycling (SHAR) Law, enacted in 1998 and entered into force on April 1, 2001, manufacturers and importers of washing machines, TV's, air conditioners, and refrigerators are required to take-back and reuse and/or recycle the discarded products they manufactured. Differentiated recycling rates range from between 50-60 percent (by weight) among the four product categories and can be fulfilled through product reuse, component reuse, and/or recycling.<sup>102</sup>

While much, if not all, of the financial burden is passed on to the consumer, the onus of collecting and transporting end-of-life appliances falls primarily on retailers, and the onus of recycling on manufacturers. Collection is divided between retailers and municipalities, with retailers collecting approximately 80 percent of the WEEE and municipalities collecting the remaining 20 percent of products taken back.<sup>103</sup> When consumers buy a new appliance, retailers are required to accept the old appliance and transport it back to its original manufacturer or to a collection center contracted through the manufacturer. Retailers collect an end-of-life fee from the consumer, which covers collection and transport costs as well as recycling costs imposed by the manufacturer. Recycling fees are set by each manufacturer for its own products; the fees range from ¥2,400-¥4,600 (\$US21-\$41).

The domestic electronics assembly industry is aggressively pursuing the removal of lead from the manufacturing process. In 1998, the Japanese government increased levies for

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<sup>101</sup> Environment of Tokyo, Overview of Japanese Legislation on Waste Management, [http://www2.kankyo.metro.tokyo.jp/anmc21\\_WM/legislation.htm](http://www2.kankyo.metro.tokyo.jp/anmc21_WM/legislation.htm), (14 June 2006).

<sup>102</sup> EPA.

<sup>103</sup> National Electronics Products Stewardship Initiative, *Financing and Infrastructure Model Characteristics*, p. 2.

recycled leaded equipment. It has established a target of removal of 90 percent of lead for domestic manufacturing.

Many speculated that manufacturers would seek to set their fees as low as possible to improve their competitive advantage and would absorb the costs of recycling in order to remain competitive through low end-of-life fees. Initially, the leading electric appliance manufacturers all set the same recycling fee for each appliance. There is also some evidence that the law caused manufacturers to change their products in ways that facilitate easier disassembly and recycling thereby enabling them to eventually offer lower end-of-life fees to their customers. Mitsubishi, for example, built its 2001 model washing machine using small standard-sized bolts, which are located in easy to find places, and can be removed with ordinary tools. There are also symbols printed inside washers to provide a roadmap of the number and location of the screws.<sup>104</sup>

Japan required businesses to recycle electronics, including computers, starting in 2001. In 2003 electronics and extended it to households in 2003.<sup>105</sup> Computers bought before 2003 incur an EOL fee when discarded; computers bought after 2003 have and ARF incorporated into the price.<sup>106</sup> Amendments to the Law for the Promotion of Effective Utilization of Resources that are scheduled to take effect on July 1, 2006, require that importers will be subject to directives in eight product categories: personal computers (including CRT and LCD displays), unit-type air conditioners, televisions, microwave ovens, clothes dryers, electric refrigerators, electric washing machines, and copying machines. Six chemical substances (mercury, cadmium, lead, hexavalent chromium, PBB, and PBDE) will be subject to labeling and reporting requirements. Japan's amended regulations will not ban these chemical substances.

### **China**

China's Ministry of Information Industry (MII) developed "Management Methods for Controlling Pollution Caused by Electronic Information Products Regulation," referred commonly to as "China RoHS," to provide a broad regulatory framework for substance restrictions, pre-market certifications, labeling and information disclosure requirements affecting a broad range of products, parts and components defined as electronic information products (EIP). The directive was issued on Feb. 28, 2006, and takes effect March 1, 2007.<sup>107</sup> According to early reports, it mandates for a phase out of heavy metals such as cadmium, mercury, lead, and hexavalent chromium as well as brominated flame retardants in future electronic products. The legislation bans the import of electronic products that do not comply with the national or industrial standards for the control of toxic or hazardous substances.

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<sup>104</sup> Rosenbach, p. 5.

<sup>105</sup> Northwest Product Stewardship Council, <http://www.productstewardship.net/policiesElectronicsIntl.html>, (14 June 2006).

<sup>106</sup> Inform, *PC Recycling in Japan*, February 2004 (13 June 2006).

<sup>107</sup> Northwest Product Stewardship Council, <http://www.productstewardship.net/policiesElectronicsIntl.html>, (14 June 2006).

Manufactured and imported products must indicate the names, contents and locations of toxic or hazardous substances or elements and recyclability in order to be imported.<sup>108</sup>

China is also developing a version of the WEEE legislation which will address regulations on recycling of used household electrical products and computers.

## **Belgium**

*(Producer managed ARF and EOL fee, consumer financed, retailer take-back and high recovery rate)*

On July 1, 2001, Federal legislation mandated that a system for the collection, transport, and recycling of electronics products be set up by manufacturers and importers in Belgium. Industry responded by creating Recupel, for the collection, transport, and recycling of WEEE. This is a non-profit organization that is managed and financed by the importers and producers. The Recupel system incorporates the principle of ‘producer responsibility’ as the companies who produce and/or put WEEE equipment on the market are obligated to take it back.<sup>109</sup> Producers assume responsibility for the costs of collecting and recycling WEEE, with Recupel conducting these activities on their behalf. The costs are then passed onto the consumer in the form of a fixed fee.<sup>110</sup> It also is based on the legal concept of the ‘take back obligation,’ to which importers and producers of EE are required by law to take back goods on a one-for-one basis.<sup>111</sup> Because of this ‘take back obligation’ Recupel does not reimburse retailers for their participation in the system, and this is one area where Recupel differs from other retailer take back initiatives.<sup>112</sup>

The Recupel system is financed by both a fixed fee paid by the consumer at the time of purchase of a new EE appliance, as well as a fee paid by the end user, which provides a fixed amount towards the cost of recycling. The type of product determines this fee. At the retail outlet, this fixed fee must be displayed separately on pricing displays as well as on the purchase invoice. WEEE products that are not part of Recupel are not to be sold by producers, importers, or retailers.<sup>113</sup> Table 4 shows this visible fee on specific products. Producers and distributors are only burdened with administering the system, as theoretically consumers pay at the point-of-sale for transport and recycling costs.<sup>114</sup>

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<sup>108</sup> Grace Compliance Specialist LLC, *China RoHS Law in English*, [www.graspllc.com](http://www.graspllc.com) (14 June 2006).

<sup>109</sup> UK Department of Trade and Industry, *Study into European WEEE Schemes*, November 20, 2003, p. 46.

<sup>110</sup> UK Department of Trade and Industry, p. 49.

<sup>111</sup> Recupel, *General Information Brochure on Recycling of WEEE*, Brussels, Belgium: May 2003, <http://www.recupel.be/recupel/pdf/RECUPEL%20brochure%20recyclage%202003%20EN.pdf>.

<sup>112</sup> UK Department of Trade and Industry, p. 56.

<sup>113</sup> UK Department of Trade and Industry, p. 49.

<sup>114</sup> UK Department of Trade and Industry, p. 56.



**Table 4: Recycling Contributions set by Recupel**

Since July 1, 2001 (Euro VAT Included) based on 2003 report<sup>115</sup>

Household Appliances – BW - REC	
Cooling and Freezing Equipment	€20
Large Appliances	€10
Small Appliances	€5
Vacuum Cleaners	€3
Audio and Video Equipment - AV	
Image reproduction	€11
Image/Sound reception, recording, and reproduction	€6
Sound recording/reproduction	€1.5
Portable equipment and car audio	€3
Image printers and projectors	2€
Others	0.1€
Small household appliances - SDA	
Equipment for home environment	€1
Women's care appliances	€1
Health	€1
Food Preparation	€1
Clocks	€1

ICT Equipment	
Complete PC System	€9
PC's and typewriters	€3
Monitors	€6
Laptops and peripheral units	€2
Paper printers	€2
Photocopiers	€3
Small computer equipment	€0.5
Telecommunications equipment	€0.5
Other	€0.1
Electrical Gardening equipment and tools – ET&G	
Electrical Gardening Equipment	€2
Electrical Tools	€2

Under Recupel, producers are also responsible for monitoring EE equipment from its production until its end-of-life treatment. Consumers are also able to return WEEE products to a retail outlet when they are purchasing new equipment. Furthermore, consumers are eligible to return equipment at no cost to a waste collection center as well.<sup>116</sup> The costs of collection, treatment, and recycling are invoiced to Recupel by the companies performing the services.<sup>117</sup>

Recupel has five sectoral management agencies that each focus on one group of products<sup>118</sup>:

1. Recupel AV – Consumer electronics
2. Recupel ICT – IT, telecommunications, and office equipment
3. Recupel SDA – Small domestic electrical appliances
4. Recupel BW-Rec – Large domestic electrical appliances
5. Recupel ET&G – Electrical tools and electrical garden equipment

In terms of infrastructure and collection of WEEE, by the end of the year in 2003 “Recupel had a national network of 1,800 active collection points and collected more than 45,000

<sup>115</sup> UK Department of Trade and Industry, p. 49.

<sup>116</sup> UK Department of Trade and Industry, p. 46.

<sup>117</sup> UK Department of Trade and Industry, p. 49.

<sup>118</sup> Recupel, Annual Report 2003, Brussels, Belgium 2003, p. 4, <http://www.recupel.be/recupel/pdf/annualreport2003.pdf>.

tonnes<sup>119</sup> of WEEE across the whole of Belgium.”<sup>120</sup> This collection figure breaks down into an average of 3,740 tons per month and an average of 4.5 kilograms per person, which would meet the objectives for the European WEEE directive of 2005.<sup>121</sup> According to Recupel estimates, 21 percent of its total WEEE collected comes from electrical and electronic retailers, with an additional 63 percent coming from municipal and inter-municipal container parks.<sup>122</sup>

Recupel has been successful in gaining wide participation from producers and importers in the country. This high level of participation is attributed to its “heavy investment in monitoring and reporting” and the fact that “Recupel operates its own register of companies operating in the electrical goods arena, and actively contacts the names of those non compliant to the authorities.”<sup>123</sup> For example, the total number of members and affiliations doubled during 2002<sup>124</sup> and in 2003 consisted of 1,826 affiliations as well as 1,134 members.<sup>125</sup>

In 2003, Recupel met or nearly met its legal recycling targets accounting for material recovery of WEEE products. Table 5 shows the performance of Recupel against its recovery objectives:

This system is generally seen as successful in that it is close to meeting its recycling targets, it has high participation from importers and manufacturers, and is very close, if not adequately, satisfying WEEE Directive objectives for 2005.<sup>126</sup> Updated statistics and information on consumer fee contributions can be found in the Annual Report of Recupel.<sup>127</sup>

**Table 5: Recupel Recycling Targets 2003 by Product Category (material recovery)<sup>128</sup>**

Product Type	Recycling Target	Performance
Large Domestic Appliances	90%	84%
Refrigerators and Freezers	70%	81%
TV and Computer Monitors	70%	83%
Small Domestic and ICT	70%	82%

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<sup>119</sup> A metric tonne is 1,000 kilograms or 2,200 pounds.

<sup>120</sup> Recupel, Annual Report 2003, p. 12.

<sup>121</sup> Recupel, Annual Report 2003, p. 12.

<sup>122</sup> Recupel, Annual Report 2003, p. 13.

<sup>123</sup> UK Department of Trade and Industry, p. 56.

<sup>124</sup> UK Department of Trade and Industry, p. 55.

<sup>125</sup> Recupel, Annual Report 2003, p.7.

<sup>126</sup> UK Department of Trade and Industry, pp. 56-58.

<sup>127</sup> See [www.recupel.be](http://www.recupel.be).

<sup>128</sup> Recupel, Annual Report 2003, p.18.

### **Denmark**

*(Government managed, taxpayer financed, no retail take-back, no performance data)*

The new Danish Order to comply with WEEE should be implemented in April 2006. Previous legislation governing recycling in Denmark included the Danish Statutory Order on Management of Waste from Electric and Electronic products which took effect on December 1, 1999. This legislation placed primary responsibility for WEEE with local authorities and municipalities. These entities were legally responsible for the waste throughout its collection, transport, and recycling even when it was sent abroad for processing.<sup>129</sup>

The 275 municipalities in Denmark formed 32 joint municipal-waste management companies that coordinated regional waste services. Larger urban areas such as Copenhagen, Aarhus, Alborg, and Odense formed their own waste management organizations. These regional and city waste management organizations formed two national collective organizations: Affald Denmark, a collective of city authorities, and Renosam, a collective of regional local municipalities. Both of these organizations were responsible for approximately 3.2 million of the total population of 5.2 million people in Denmark.<sup>130</sup>

This system in Denmark was funded via local household waste tax administered by local authorities. These levels of tax varied by municipality, with industrial EE recycling being financed by the end-user.<sup>131</sup>

A majority of electronic waste in Denmark was collected at collection points in containers owned and operated by local authorities. There was some curbside collection, but it was not mandatory and varied from area to area. The three types of electronic waste collected at these collection points were as follows:

- Refrigerator Items
- Electronic Items with Screens
- Electronic Items without Screens

There was no in-store take-back through the main municipal and regional authority-administered systems. Some companies offered their own take-back schemes but these operations were limited.<sup>132</sup> The local municipalities worked with approximately 30 small and medium enterprises, with recycling conducted mostly through private subcontractors. Regional and municipal recycling collectives offered contracts for the transport and recycling of collected waste.<sup>133</sup>

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<sup>129</sup> UK Department of Trade and Industry, p. 59.

<sup>130</sup> UK Department of Trade and Industry, p. 59.

<sup>131</sup> UK Department of Trade and Industry, p. 61.

<sup>132</sup> UK Department of Trade and Industry, p. 60.

<sup>133</sup> UK Department of Trade and Industry, p. 60.

The system was highly decentralized, but had a 100 percent geographic coverage of the Danish territory and the Danish population generally regarded the municipal tax system as fair.<sup>134</sup>

The Danish WEEE Order based on producer/importer responsibility, is supposed to be implemented on April 1, 2006. The provisions on labeling and registration entered into force August 2005 and January 2006, respectively. The new WEEE Order replaces previous Danish regulations on management of waste from electrical and electronic equipment (EEE).

EEE imported or manufactured after August 12, 2005 must be labeled with a crossed-out wheeled bin as well as with the name or logo of the producer/importer. The crossed-out wheeled bin label denotes that WEEE must not be disposed of with household waste but should instead be collected separately. Information to consumers of EEE must be stated in the sales and marketing material.

The municipalities in Denmark are responsible for collection schemes and collection sites for WEEE from households. This commitment is met through bring schemes, i.e. setting up containers at the municipal recycling sites or other collection sites, and/or through pick-up schemes. It is up to the municipalities to decide the schemes and they may recover costs via waste disposal fees from the households. After the WEEE has been collected, the municipalities must ensure that the waste is separated into five fractions:

- large household appliances and automatic dispensers
- small household appliances, electrical and electronic tools (excluding large-scale stationary industrial tools, toys and sport and leisure equipment, medical equipment, monitoring and regulation instruments)
- IT and telecommunications equipment
- Consumer equipment
- Lighting equipment

The municipalities will ensure 100 percent geographic coverage of the collection scheme by setting up approximately 400 collection sites. Each site will be divided into the five fractions, which means a total of 2,000 special collection containers throughout the country.

However, it is no longer the municipalities' duty to treat the waste. This obligation now lies with "WEEE System" (see below), which will dispose of the waste by allocating it to producers and importers for further treatment in accordance with market share in each of the five fractions. WEEE must be treated at plants which have been approved by the Danish EPA and fixed requirements for e.g. storage, design and reporting have been laid down by law.

The Danish Minister of the Environment has transferred a number of responsibilities concerning administration of the WEEE Order to "WEEE System", which is a private and independent non-profit organization. "WEEE System" is responsible for registration and for

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<sup>134</sup> UK Department of Trade and Industry, pp. 61-62.

laying down more detailed guidelines, procedures, etc., and "WEEE System" is also responsible for charging and collecting registration fees.

Existing producers and importers of EEE covered by producer responsibility had to be registered at "WEEE System" before January 1, 2006. New producers and importers commencing marketing of products after this date must submit a request for registration no later than 14 days prior to commencing marketing.

Producers and importers of EEE must pay "WEEE System" with regard to registration and management of the scheme. The fees are cost-dependent and are currently being negotiated. The registration fee will most likely be DKK 1,000 and the annual administration fee will be based on market share for the EEE in order to ensure that small enterprises are not burdened unfairly. Furthermore, a producer/importer must provide a financial guarantee for equipment marketed for households in order to ensure treatment of the waste. The size of the financial guarantee will be determined by "WEEE System". If a producer/importer joins a collective scheme, "WEEE System" can exempt the producer/importer from having to provide a financial guarantee for equipment. So far there are three collective schemes in Denmark.

Sellers and distributors need only take back WEEE if they offer it voluntarily and should only take back the same type of EEE as they sell. If a seller or distributor offers to take back WEEE, consumers should be able to return the WEEE free of charge. Enterprises are only allowed to charge for any additional services, such as transporting WEEE from households. A seller/distributor must use the collection schemes provided by the municipality. In cases of larger volumes of WEEE, the seller/distributor must, however, make an agreement with "WEEE System".

With regard to equipment for use by trade and industry (B2B) sold after April 1, 2006 the producer/importer is responsible for take-back and treatment of the equipment (individually or through a collective scheme). The producer/importer can also make an agreement with the buyer to the effect that the buyer will take over the commitments. The producers/importers are required to inform "WEEE System" about such agreements.

All WEEE which is not subject to producer responsibility regulation is considered as "waste from *other* electrical and electronic equipment". The municipalities are responsible for collection and treatment of this type of waste.

The WEEE Order stipulates that municipal treatment plants may continue until December 31, 2006. Subsequent to December 31, 2006 the municipal WEEE treatment sites may continue if they are separated from other municipal operations and compete on equal market terms.

In 2005 between 35,000 and 40,000 tons of WEEE and CFC-containing refrigeration appliances were collected and separated for special treatment. It is the European Commission's target that, before December 31, 2006 EU Member States will be collecting at least 4 kg of WEEE per inhabitant per year from households, which corresponds to approximately 21,500 tons in Denmark.

The Danish EPA has estimated that the cost for society will be between DKK 150 to 175 million per year. The municipalities' costs of collecting and treating WEEE are estimated at almost DKK 100 million in 2005, so the expected extra cost for society will be DKK 50 to 75 million annually.<sup>135</sup>

## **Netherlands**

In the Netherlands, there are two take-back systems, which were established by manufacturers and importers: ICT Milieu and the Netherlands Association for Disposal of "Metaelectro" Products (NVMP). Both programs are voluntary programs started by manufacturers and importers in December 1999. NVMP covers white and brown goods (i.e. refrigerators and electrical consumer products such as television sets) and ICT Milieu covers ICT equipment (i.e. computers, printers, fax machines, photocopiers, and telephones). These two programs are based upon the 'take back obligation' of producers/importers, as well as an April 21, 1998 Decree from the Dutch Government which established rules for taking back and recycling white and brown goods after use. This Decree states that producers or organizations to which they are affiliated must notify the Ministry of the Environment of the manner in which they will collect the goods, the percentage of these products that will be re-used, the manner in which the remaining percentage will be disposed of, the manner in which the system will be financed, and the monitoring and auditing means that have been instituted.<sup>136</sup>

### *ICT Milieu*

*(Government collection, producer responsibility, CI or PCI, TPO)*

ICT Milieu uses a two-tier collection system through 540 municipal collection sites and 65 regional collection and sorting depots. Under this system, private households may dispose of their ICT WEEE either by returning, at no charge, the old product to the retailer or supplier when purchasing a new product or by handing in the old product to the municipality. This last service varies from curbside pickup in some areas to private consumers being directed to drop-off their old products at a designated collection point in the municipality in other areas. Some areas also charge a fee for this service.<sup>137</sup>

Business consumers in the Netherlands wishing to dispose of ICT WEEE are free to sell or pass on equipment to third parties, as well as to exchange 'old for new' products with the supplier and/or retailer when purchasing new products. Business consumers wishing to dispose of old products without purchasing new products can either offer the products to the relevant manufacturer or importer directly or can have the old products collected and disposed of by their industrial waste collector. However, although a number of manufacturers and importers do take back their branded products from consumers in the Netherlands, the

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<sup>135</sup> See Danish EPA, <http://www.mst.dk/homepage/>, and WEEE System, [www.weee-system.dk](http://www.weee-system.dk).

<sup>136</sup> UK Department of Trade and Industry, p. 65.

<sup>137</sup> UK Department of Trade and Industry, p. 67.



manufacturer or importer is under no obligation to take back the old products in this situation.<sup>138</sup>

Initially, ICT Milieu set up a system, which was financed by a fixed annual fee plus a charge per kilo of equipment taken back and processed, according to brand. The charge reflected the actual costs for collection, sorting, and recycling of a specific manufacturer's products but there was a high level of free rider and orphan products on the market, estimated to be approximately 44 percent, for which the manufacturer could not be charged. Because of this, as well as the issue that brand sorting proved to be too expensive and was not transparent, the ICT Milieu financing system was changed in January 2003 to a 'current market share' system. Under this new financing system there is a fixed annual fee for membership in the ICT Milieu system, along with a variable cost dependent upon current market share. Dutch legislation requires all companies to make a declaration of the total weight of equipment put onto the market in a certain period by category of equipment. The company's total percentage of the weight per category is the basis for calculating a distribution factor. Each month manufacturers and importers participating in the ICT take back system pay a share in the disposal costs (including the costs for the disposal of orphaned goods/free rider goods). There is no visible fee imposed but companies must absorb the costs of participation or pass them on through the retail supply chain.<sup>139</sup>

In 2002, ICT Milieu collected a total of 9900 tons of products, at a cost of €14 million.<sup>140</sup> The system operates on a minimal cost and staffing base, with transporters and recycling companies paid on the basis of weight of WEEE handled. In addition, 25 percent of total revenues go towards the operation of regional collection and sorting depots. In 2003, there were 178 companies participating in the system and ICT Milieu estimates that these participants were responsible for approximately 80-90 percent of the ICT volume entering the market in the Netherlands.<sup>141</sup>

### *NVMP*

*(Government collection, financed by taxes, industry-managed ARF)*

NVMP was begun in response to the Decree of April 21, 1998 to establish rules for taking back and processing white and brown goods after use. This organization organizes the transportation and recycling of cooling and freezing products, large white goods, TV and video products, and small household items. Collection for these goods is handled by local authorities, which have organized into the NVRD, which is a branch organization of public waste collection and cleansing companies. These local authorities are charged with organizing separate collection for WEEE as well as establishing local collection facilities where consumer and suppliers can discard old products. In 2003, there were approximately 600 local collection points throughout the Netherlands. Consumers can bring a non-

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<sup>138</sup> UK Department of Trade and Industry, p. 67.

<sup>139</sup> UK Department of Trade and Industry, p. 68.

<sup>140</sup> ICT Milieu, *ICT Milieu – Three Years Experience with Electronics Recycling in the Netherlands: Organizational and Financial Aspects*, July 2003, p. 15.

<sup>141</sup> UK Department of Trade and Industry, pp. 71-73.



functioning product back to the supplier and apply it towards the purchase of a new product. Retailers must also transport the equipment from the consumer's house on payment of a removal fee. Old products can also be deposited in a municipal waste site or can be collected by the municipality.<sup>142</sup> NVMP collected approximately 65,000 tons of WEEE in 2002.<sup>143</sup>

Following the sorting of products, local authorities transport the waste to 69 Regional Transfer Stations (RTS), which are organized by the NVRD. The private sector, however, does assume some of the financial responsibility for operating the RTS. Transport of the products is financed by NVMP and is outsourced to a single supplier for the whole country and NVMP also outsources all recycling activities to four specialist companies who in turn make use of eight plants to conduct recycling. When purchasing new EE appliances, the end user contributes a fixed amount to the costs which finances the collection, transportation, treatment, as well as the regional collection centers, administrative costs, and communication expenses. Producers and importers are contracted to show the amount of these contributions on the purchase invoice. These contributions are paid to NVMP every two months on the basis of the number of appliances on the market. The level of the visible fee is set per unit, based on the type of equipment. Local authorities are responsible for collection and sorting from distributors or households, the rest of the system is financed by NVMP. Local Regional Authorities (LRAs) finance the separate collection of WEEE by levying local taxes. Also when consumers buy EE equipment they often pay a removal contribution in addition to the purchase price. The visible fees in the Netherlands are currently among the lowest in the comparable European systems. Table 6 shows visible fees, established in 2001, by product type.<sup>144</sup>

**Table 6: NVMP Visible Fee by Product Type<sup>145</sup>**

<b>Product Type</b>	<b>Visible Fee Euro/Unit Including VAT</b>
Cooling and freezing appliances	€17
White Goods	€5
Small household appliances	€0-1
Electric heaters	€4.54
Electronic equipment	€3-8
Electronic pianos	€2
Hairdryers, sewing machines	€9.08
Fans, radio, garden tools	€0
Kettles	€0.68-9.08
Electrical tools	€1

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<sup>142</sup> UK Department of Trade and Industry, pp. 75-77.

<sup>143</sup> UK Department of Trade and Industry, p. 80.

<sup>144</sup> UK Department of Trade and Industry, p. 78.

<sup>145</sup> UK Department of Trade and Industry, p. 79.

The Ministry of the Environment has indicated that there was some inefficiency in operating two schemes in the Netherlands and that this resulted in a certain amount of task duplication.<sup>146</sup> However, ICT Milieu, along with NVMP, currently meets the national collection targets set out in the WEEE Directive.<sup>147</sup> Furthermore, the development of the visible fee system, in NVMP, on a national level brought about economies of scale, which led to a reduction in the level of the fees for certain types of appliances. For example, fees for certain small appliances were eliminated to improve administrative efficiency and reduce costs.<sup>148</sup>

### **Norway**

*(EPR or ARF, depending on product, collection by government, retailers and producers)*

The collective program for the transport and recycling of WEEE in Norway is called El-Retur. El-Retur, which started on July 1, 1999, consists of two collaborating waste management companies, Hvitvareretur AS and Elektronikketur AS, which were established by their respective National Trade Associations in response to national legislation. This legislation from the Ministry of the Environment, passed on March 16, 1998 is titled “Regulations regarding Scrapped Electrical and Electronic Products.” It states that producers/importers of household appliances and electronics are required to provide take-back for recovery when scrapped by consumers and businesses.<sup>149</sup>

Both waste management companies, Hvitvareretur AS and Elektronikketur AS, are non-profit organizations, and no dividends are paid out to the owners. The companies are run as independent administrative companies, which purchase and administer services relating to the collection and recycling of the WEEE products under their jurisdiction. For example, Hvitvareretur AS is responsible for the recovery of professional and domestic white goods, microwaves, and oil-filled heaters while Elektronikketur AS is responsible for the recovery of brown goods (audio-video), electrical and electronic games, medical equipment, office machinery, and telecommunications equipment. The El-Retur program negotiates contracts for 3-year periods with 6 logistics companies and 12 recycling companies, which provides 100 percent geographical coverage for all of Norway.<sup>150</sup>

Under El-Retur, consumers may deliver WEEE free of charge, and without having to make a further purchase, to retailers who sell the same product as well as to municipalities regardless of the product type involved. Commercial enterprises may deliver WEEE to retailers who sell the same product in return for making a further purchase on a one-on-one basis. They may also deliver WEEE to municipalities, who may then impose a charge for such delivery. Collection equipment, including cages and containers, are provided free of charge to municipalities and dealers. Furthermore, El-Retur collects from these locations free of

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<sup>146</sup> UK Department of Trade and Industry, p. 73.

<sup>147</sup> UK Department of Trade and Industry, p. 74.

<sup>148</sup> UK Department of Trade and Industry, p. 78.

<sup>149</sup> UK Department of Trade and Industry, p. 88.

<sup>150</sup> UK Department of Trade and Industry, pp. 88-89.

charge, as well as from commercial enterprises such as workshops, waste companies, offices, industry and associated producers with payment on a discretionary basis. In Norway, there are six transport and logistic partners each covering a certain region of Norway, as well as five recycling partners who each cover certain geography. These recycling partners use subcontractors for specialist products (CFCs) or regions and there are a total of 12 recycling plants.<sup>151</sup> In 2002, municipalities collected approximately 51 percent of WEEE, retailers 31 percent, direct delivery to plants accounted for 4 percent, and other collection points were responsible for 14 percent of total WEEE collected under the El-Retur program.<sup>152</sup>

The El-Retur system operates 4 separate financing methods for different product categories--one in Elektronikketur and one for Hvitvareretur. The three owner organizations under Elektronikketur AS have set up their own finance companies, which provide for monthly costs that are transferred from Elektronikketur based upon their respective product areas. Each of these finance companies has chosen a slightly different model for the collection of money. For example, Lydog Bilde Retur, the finance company for EE-bransjen, which is in charge of brown goods, collects money from the relevant importers/manufacturers on the basis of the type and number of brown goods sold to the Norwegian market. IKT Retur AS, the finance company for IKT-Norge, which is responsible for IT products, electronic/electrical games, and office machinery, uses a financing model that is based on invoicing actual costs. The costs are divided between the relevant importers and manufacturers on the basis of actual market share in respect of each individual product category. IT Retur AS, the financing company for Abelia, which is responsible for medical equipment, electronics, and telecom equipment, also uses this financing model where actual recycling costs are based on market share in respect to each individual product category.

Hvitvareretur AS finances its system by collecting fixed environmental fees from its affiliated companies and cooperates in this respect with the Norwegian Directorate of Customs and Excise. Via the ordinary import and production customs clearance system, each affiliated company notifies products that are subject to fee. The fees are paid in connection with the companies' payment of duties (VAT, etc.) and this system is unique in Europe and functions because Norway lies outside the European customs area. For example, in 2002, environmental fees accounted for NOK 87 million, which covers current and future commitments relating to the collection and recycling of WEEE. Visible fees are recommended, though voluntary, and industry is not allowed to impose the visible fee on retailers, but most retailers do choose to display the visible fee. The recycling fees are based on costs determined for 44 product groups and are applied in terms of what the actual collection and recycling costs are. Handling fees are included in the municipal waste fees for WEEE deposited at municipal collection sites and the general administration of municipal collection is financed by local taxes.<sup>153</sup>

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<sup>151</sup> UK Department of Trade and Industry, p. 89.

<sup>152</sup> UK Department of Trade and Industry, p. 93.

<sup>153</sup> UK Department of Trade and Industry, pp. 90-91.

El-Retur collected and recycled over 35,000 tons of WEEE in 2002, amounting to more than 8kg per head of population. Of this figure, Hvitevareretur contributed approximately 5 kg and Elektronikketur 3 kg per capita.<sup>154</sup> This system currently meets the recycling targets set out in the WEEE Directive, as Table 7 shows. Hvitevareretur has a recycling rate of 88 percent and Elektronikketur has a recycling rate of 81 percent.<sup>155</sup> Norway also has the closest product scope in Europe to the WEEE Directive<sup>156</sup>

**Table 7: El Retur Recycling of WEEE 2002 (%)**<sup>157</sup>

	<b>Elektronikketur AS</b>	<b>Hvitevareretur AS</b>
Recycling	74%	79%
Energy Recovery	14%	2%
Disposal	9%	18%
Thermal Destruction	3%	1%
Rate of Recovery	81%	88%

### Sweden

*(EPR for one-to-one take-back only managed through TPO, historic and orphan scrap financed and managed by the government)*

On July 1, 2001, Swedish producers and distributors created El Kretsen, a non-profit service provider, to represent themselves in an agreement with the Swedish Authorities to operate a voluntary nationwide take-back system. El Kretsen is a joint solution, which involves Local Regional Authorities, as well as the producers, manufacturers, importers, and retailers. This organization was created in response to Ordinance SFS 2000:208, which came into force on January 7, 2001, based on producer responsibility and provides for mandatory preliminary treatment of WEEE, as well as an obligation on the part of producers to set up a system of free take-back against purchase.<sup>158</sup> Specifically, Swedish companies who import, manufacture, or sell electrical products must offer its customers, households and businesses, an opportunity to dispose of discarded products for recycling.

Household collection centers, where consumers can dispose of electronic products free of charge, are financed by local authorities. El-Kretsen is responsible for financing the transport of the household waste from the collection centers and its recycling. It also is responsible for financing the collection, transport and recycling of WEEE from commercial consumers. Swedish law requires that the consumer has to see the total price of a product. Therefore, importers and producers add a special waste management charge to their invoices to cover costs of recovering products that are returned at the time of sale.

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<sup>154</sup> UK Department of Trade and Industry, p. 90.

<sup>155</sup> UK Department of Trade and Industry, p. 93.

<sup>156</sup> UK Department of Trade and Industry, p. 96.

<sup>157</sup> UK Department of Trade and Industry, p. 96

<sup>158</sup> UK Department of Trade and Industry, p. 99.

El-Kretsen is a limited company, owned by the professional federations from 20 sectors dealing with EE products. Although it is non-profit, it is required to have financial reserves available to compensate for short-term variations in levels of collection.<sup>159</sup> This company is responsible for the following product groups<sup>160</sup>:

- Household appliances
- Hand and garden tools
- IT and office equipment
- Telecommunication equipment
- Television, audio, and video equipment
- Photographic equipment
- Watches and clocks
- Games and toys
- Light sources and fittings for light sockets
- Medical technical equipment
- Laboratory equipment

The following products are not covered under El-Kretsen<sup>161</sup>:

- Freezers and Refrigerators
- Fixed installed equipment for heating, cooling or ventilation
- Permanently installed equipment (fuses, control devices, detectors)
- Batteries (Separate system operates)
- Dispensers
- Production equipment (apart from electric hand tools)

In Sweden, there are 650 household collection points for household WEEE and 300 for commercial customers, at least one collection point in each of the 289 municipalities where either household or commercial consumers can leave products free of charge. There is also collection provided for larger institutions and commercial enterprises, as well as additional locally designed systems of collection (curbside pickup, call systems, etc.), which are financed through municipal tax or other fees. Household consumers may return WEEE to any of the more than 600 collection sites that are paid for and administrated by municipalities free-of-charge. Commercial consumers may either return products to producers/retailers for a take-back against purchase or they may deposit the products free-of-charge at one of the 300 business collection centers. El-Kretsen provides collection services on commission and gives companies an opportunity to deliver discarded products directly to the pre-treatment facilities contracted by El-Kretsen. El-Kretsen also collects disposed TVs, radios, videos, and other

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<sup>159</sup> UK Department of Trade and Industry, p. 99.

<sup>160</sup> UK Department of Trade and Industry, p. 99.

<sup>161</sup> UK Department of Trade and Industry, p. 99.

products from stores and service workshops. This service is free for stores who have bought new products from producers that are members of El-Kretsen. More than 3,000 stores and workshops were affiliated with El-Kretsen in 2004.

El-Kretsen is financed through membership fees. These fees are calculated from the volumes of new sales reported by the member companies. Since the legal requirements contain a wide range of products, El-Kretsen has designed adaptations that fit each industry sector in terms of fee structuring, product range and the level of collection service. There are two fixed fees: an Entrance Fee of SEK 3,500 per supplier and an annual membership fee of SEK 500 (in 2006) In addition to this, the members pay flexible fees based on three models: a per unit charge based on the previous months sales; ICT products charge, described below; or other special models for certain industries, such as based on quarterly sales. The ICT products model involves El Kretsen AB calculating the actual costs for collecting and recycling ICT products. These actual costs are then divided among the suppliers in proportion to each supplier's market share. The market share is defined as sales volume the previous quarter, express in tons. Previously, companies selling less than three tons were charged a standard fee. The ICT model also allows suppliers to finance the collection and recycling of their products themselves, as long as the recycling company is approved by El-Kretsen and verified through "recycling certificates."<sup>162</sup>

Table 8 outlines the amount of electronic waste collected by El Kretsen in 2001 and where it ends up:

**Table 8: El Kretsen Material Recovery (2001)<sup>163</sup>**

	<b>Tons</b>	<b>% of total collected</b>
Total Tonnage collected and sorted	60000	
Tonnage recovered and recycled	42000	70%
Tonnage with energy recovery	12000	20%
Tonnage in landfills	6000	10%

Material recovery has increased by 10 percent in 2004: 87,000 total tonnage was collected and sorted, and 60,900 tonnage was recovered and recycled.<sup>164</sup>

Under El-Kretsen, local authorities are legally responsible for the recycling of historic WEEE and in 2003 assumed financial responsibility for all historic TV, audio, and video equipment because the brown goods sector withdrew from the El Kretsen system. This sector preferred to operate strictly according to the legislation at the time, which set out a new-for-old system with retailer collection. These products accounted at the time for approximately 10 percent of all WEEE, while El Kretsen processed the remaining 90 percent of the waste stream. El Kretsen estimated that costs for the transport, logistics, and recycling of this 10 percent

<sup>162</sup> El Kretsen Product List and Fees 2006-01-01, <http://www.el-kretsen.se/> (April 18, 2006).

<sup>163</sup> UK Department of Trade and Industry, p. 104.

<sup>164</sup> El Kretsen AB Annual Report 2004-2005, February 2005.



outside its system were twice of its costs for the remaining 90 percent.<sup>165</sup> The brown goods sector criticized El Kretsen for its high costs for participation, however, El Kretsen took the position that it was a victim of its own success, because the large volumes the system collected imposed significantly higher costs than would otherwise be incurred under the legal minimum one-for-one take back obligation. It concedes that there was weak enforcement legislation as well.<sup>166</sup>

## **Switzerland**

*(Producer-managed ARF, retailers, distributors and government collection financed by ARF, consumers obligated to return products)*

The Swiss Association for Information, Communications and Organization Technology (SWICO) system was set up following a Government initiative in Switzerland and a subsequent order was adopted to expand the system to all electronic products: ORDEA (Order on the return, take-back, and disposal of electrical and electronic equipment) of January 14, 1998 (RO 1998 827). Under this system, producers/importers have a take-back obligation, which is transferred to SWICO. Distributors and retailers have an obligation to take-back WEEE free of charge and households/firms to return out of service equipment. The regulations, however, do not impose any collection or recycling targets. This legislation is unique because it places a legal obligation on consumers to return out of use electrical and electronic equipment and not to dispose of such equipment in the municipal waste stream. Another organization, S.E.N.S., which is similar to SWICO, organizes the collection and recycling of household white goods, small domestic appliances, gardening equipment, tools and toys. This system is run by a separate trade association, but has collection and transport methods similar to SWICO and both systems share much of the infrastructure. Approval from the Swiss Government is required to export recycled goods.<sup>167</sup>

An environmental commission within the trade association runs SWICO. This commission groups together ten members, of which nine represent importers and producers of electronic and electrical equipment: (Afga-Gevaert, Canon, Excom, IBM, HP, Motorola, Phillips, Sun, and Xerox). The development and performance of the SWICO system is overseen by this commission in respect to setting the level of the Advanced Recovery Fee (ARF), monitoring financial balances, developing operational processes for collection and recycling, organizing public tenders for logistics and recycling centers, and organizational matters. The products covered under the SWICO system encompass the following product groups<sup>168</sup>:

- Consumer electronics
- Information technology and office equipment
- Telecommunication equipment
- Household appliances

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<sup>165</sup> UK Department of Trade and Industry, pp. 106-107.

<sup>166</sup> UK Department of Trade and Industry, p. 105.

<sup>167</sup> UK Department of Trade and Industry, p. 109.

<sup>168</sup> UK Department of Trade and Industry, p. 110.



- Components originating from these types of equipment

Households and firms can deposit used equipment at the point of sale, directly with producers/importers, and also at 340 accredited collection centers. Under the SWICO system, municipalities have no take-back obligation so they can either choose to not organize WEEE collection and simply inform end-users about alternative collection points or organize occasional, bi-annual WEEE collection which SWICO will provide transport pallets and finance all costs involved. Municipalities may also take discarded WEEE appliances and those goods not ‘actively collected’ to collection points free of charge. For municipalities that collect in excess of 5 tons per year, the municipal collection point is enlarged to become an official SWICO collection point. For transportation of these collected goods, SWICO has an agreement with a single transport firm to provide service for all of Switzerland. 16 private firms are contracted to conduct recycling of collected WEEE and they are selected by invitation to tender for a period of two years.<sup>169</sup>

The SWICO system is financed via an Advanced Recovery Fee (ARF) and its levels are determined on the basis of an assessment of the quantity of items of equipment collected and transport/recovery costs. Table 9 shows the contribution per unit, including tax. These contributions are paid by distributors and producers on a bi-annual basis of the amount of equipment put onto the market. These fees are then invoiced to the consumer at the point of sale and are shown on the invoice.<sup>170</sup> Revenues and expenses are booked separately for each product sector and each operates autonomously to ensure no cross-sector subsidies.<sup>171</sup> In 2002, approximately 75 percent of costs in the SWICO system were spent on recycling and treatment of WEEE, with only 14 percent spent upon logistics and transport. This is a significantly lower proportion than other European systems and is primarily due to the regional configuration of the SWICO system, where average transport costs are based upon 30km haulage.<sup>172</sup>

In 2002, SWICO collected and processed approximately 24,000 tons of WEE, with 58 percent of these products being collected at the point of sale. Of the remaining WEEE, 18 percent was collected from producers/importers and 24 percent direct from the 340 accredited collection centers. A majority (69.60 percent) of the goods collected represented IT and office equipment, and nearly 30 percent of the WEEE volume by weight was made up of consumer electronics.<sup>173</sup> There are no legal targets for recycling of WEEE, but SWICO states that all collected products are recycled.<sup>174</sup> Furthermore, since Switzerland belongs neither to the EU nor the EEA, SWICO is not obliged and does not intend to change its operational structure in accordance with the WEEE Directive. However, it does want to

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<sup>169</sup> UK Department of Trade and Industry, pp. 110-111.

<sup>170</sup> UK Department of Trade and Industry, p. 111.

<sup>171</sup> UK Department of Trade and Industry, p. 112.

<sup>172</sup> UK Department of Trade and Industry, p. 116.

<sup>173</sup> UK Department of Trade and Industry, p. 114.

<sup>174</sup> UK Department of Trade and Industry, p. 115.

**Table 9: SWICO Fixed Fee Rate per Item<sup>175</sup>**

Item <sup>176</sup>	Fixed Fee Rate <sup>177</sup>
TV sets	€10-20
Complete audio/DVD installations	€6.85
Separate audio/video items	€3.42
Portable equipment	€1.37
Professional equipment (> €6850)	€13.7

operate in a manner in accordance with European best practice as well as to allow better integration of the Swiss system into the EU model, so there are plans underway, with Swiss authorities, to reclassify waste according to the categories in the directive.<sup>178</sup>

## Australia

In Australia, the electrical and electronic industry associations are developing an industry-wide voluntary product stewardship strategy. Their work is being guided by a working group composed of representatives of the commonwealth, state and territory environmental agencies, the Australian Industry Group, and the Australian Chamber of Commerce and Industry. The industry-led voluntary stewardship strategy will address environmental issues in five consumer product categories<sup>179</sup>:

- Personal computers and peripherals
- Televisions, video cassette recorders, and home entertainment electronics
- Major household appliances
- Small appliances
- Lamps

There is also consideration by state environment ministers in Australia, with the support of major television manufacturers, to introduce a plan that would impose an \$18.75 (\$US) recycling fee on the sale of new televisions. Funds that were collected via this fee would be used to develop and administer a national recycling system for televisions. Members of the

<sup>175</sup> UK Department of Trade and Industry, p. 112.

<sup>176</sup> For IT and Telecom equipment, a fee is charged according to the retail cost of the product, based upon 10 retail price bands.

<sup>177</sup> Consumer goods priced less than €35.00 are not subject to the ARF.

<sup>178</sup> UK Department of Trade and Industry, p. 120.

<sup>179</sup> U.S. Environmental Protection Agency, *Product Stewardship: International Initiatives* website, <http://www.epa.gov/epr/products/eintern.html>, (November 13, 2004).

television manufacturing industry expect that the fee level would drop once the recycling system has disposed of historic and orphan waste products.<sup>180</sup>

Furthermore, in compliance with the Basel Convention, Australia passed the *Hazardous Waste (Regulation of Exports and Imports) Act of 1989*. This Act was amended in 1996 to allow Australia to better comply with Basel, but as of 2004 the Australian Department of the Environment and Heritage was still “working with industry to enhance controls on electronic scrap exports, including developing a process to determine whether electronic equipment should be managed as waste under the Act.”<sup>181</sup> This work also involves the Australian Government continuing its dialogue and work with industry and state governments to develop a national product stewardship approach to managing electrical and electronic waste. There are pilot recycling projects by state and territory governments in Sydney and Melbourne as well.<sup>182</sup>

### Canada

Sixteen leading IT and electronics companies have joined forces to create Electronics Product Stewardship Canada (EPS Canada), which is a non-profit organization that will design, promote, and implement sustainable solutions for Canada’s electronic waste problem. The organization is currently consulting with governments, consumers, and other stakeholders across Canada to design appropriate programs for safe reuse and recycling of equipment such as personal computers, laptops, printers, and television products. EPS Canada expected to launch its first end-of-life management program in 2004. Founding members of the organization include Apple, Brother International Corporation, Canon, Dell, Epson, Hewlett-Packard, Hitachi, IBM, Lexmark, LG Electronics, Panasonic, Sanyo, Sharp, Sony, Thompson, and Toshiba. Participating industry associations include the Information Technology Association of Canada and Electro-Federation Canada.<sup>183</sup>

Legislative responsibility in Canada lies with the provinces and territories. Alberta announced on May 6, 2004 that it was launching Canada’s first provincial electronics recycling program. Retailers began collecting an ARF called an “environmental fee” ranging from CAD \$5-\$45 in February 2005. Consumers pay an additional CAD \$5 for laptop computers, while televisions 46 inches or larger receive the CAD \$45 fee. These fees are then used to fund collection at no cost to the consumer, transport, recycling by “qualified” processors, research into better recycling technologies, as well as a consumer education

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<sup>180</sup> Northwest Product Stewardship Council, *Electronic Equipment and Product Stewardship: International Policies and Legislation*, <http://www.productstewardship.net/policiesElectronicsIntl.html>, (November 13, 2004)

<sup>181</sup> Australian Department of Environment and Heritage, *Annual Report 2003-2004*, pp. 610-612, <http://www.deh.gov.au/about/annual-report/03-04/pubs/hazardous-waste.pdf>.

<sup>182</sup> Australian Department of Environment and Heritage, p. 94.

<sup>183</sup> Electronic Products Stewardship Canada, <http://www.epsc.ca/about.html>.

program. The program is administered by the Alberta Recycling Management Authority, which is a TPO.<sup>184</sup>

## **Taiwan**

*(Government managed system financed by producers CI or PCI)*

Recycling policies implemented in 1998 made Taiwan the first country to require the recycling of used computer hardware, including central processing units, monitors, and notebook computers. Consumers can return used hardware to one of 600 take-back stations, operated around the country, or to a recycling company or municipal recycling facility, where the hardware is disassembled and separated for reuse or recycling. As of October 2000, roughly 1.4 million used computers had been recycled, and officials of Taiwan's Environmental Protection Administration said that they were achieving a recycling rate of approximately 75 percent of all used computers. In 2001, Taiwan added printers to the list of equipment that must be recycled.<sup>185</sup>

In Taiwan, local government collects the products and also arranges for recycling of products, with the Federal government providing funds to local government for these services. OEM's paying fees to government based upon product sales finance this system, and the companies either internalize the costs or pass them on to the consumer. The government sets the level of the fees as a result of the recycling costs, and consumers may return products free-of-charge.<sup>186</sup>

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<sup>184</sup> Electronics Recycling Alberta, [www.albertarecycling.ca](http://www.albertarecycling.ca), and Northwest Product Stewardship Council, *Electronic Equipment and Product Stewardship: International Policies and Legislation* website. <http://www.productstewardship.net/policiesElectronicsIntl.html>.

<sup>185</sup> Rosenbach, p. 5

<sup>186</sup> National Electronics Products Stewardship Initiative, *Financing and Infrastructure Model Characteristics* p. 3.

## **APPENDIX II**

### **U.S. FEDERAL GOVERNMENT LEGISLATION AND REGULATION**

#### **U.S. Federal Solid Waste Management Regulations**

##### *Hazardous Waste*

The Resource Conservation and Recovery Act (RCRA), pronounced "rick-rah", enacted by Congress in 1976, gave EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of municipal solid wastes.

The Federal Hazardous and Solid Waste Amendments (HSWA) are the 1984 amendments to RCRA that required, among other things, limitations on the land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a corrective action program for facilities that treat, store, or dispose of hazardous waste.

Under regulations promulgated by EPA, a waste is considered hazardous if it is ignitable (i.e., burns readily), corrosive, or reactive (e.g., explosive). Waste may also be considered hazardous if it contains certain amounts of toxic chemicals. Toxicity is determined through the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP test determines which materials are likely to leach contaminants in an acidic environment modeled after municipal solid waste landfills and thus would leach into surrounding water that would be harmful to human health or the environment. In addition to these characteristic wastes, EPA has also developed a list of over 500 specific hazardous wastes. Hazardous waste takes many physical forms and may be solid, semi-solid, liquid, or even contained gases. EPA regulations also contain exclusions for certain wastes from the definition of solid waste or hazardous waste. In addition, EPA has developed streamlined rules for particular wastes, including recyclable wastes and universal wastes such as batteries, pesticides, mercury-containing equipment, and lamps that are widely generated by different industries.

The RCRA hazardous waste program regulates commercial businesses as well as Federal, state and local government facilities that generate, transport, treat, store, or dispose of hazardous waste. Each of these entities is regulated to ensure proper management of hazardous waste from the moment it is generated until its ultimate disposal or destruction. RCRA does not regulate residential waste, even when it contains hazardous materials. EPA has also exempted businesses that produce less than 220 pounds of hazardous waste a month under the Conditionally Exempt Small Quantity Generators (CESQG) rule, provided certain limited conditions are met.

Handlers of hazardous waste must meet certain regulatory requirements. Generators and transporters must have government issued identification numbers, and comply with other

regulations regarding the handling of hazardous waste. Treatment, storage, and disposal facilities must meet even more stringent requirements, and must have a permit to operate.

The RCRA municipal solid waste program also regulates owners and operators of municipal solid waste landfills. The regulations stipulate minimum criteria that each landfill must meet in order to continue operating.

#### *State Authority*

EPA may authorize qualified states to administer and enforce the RCRA hazardous waste program within the state. Following authorization, states implement the program in lieu of EPA, although EPA retains enforcement authority. RCRA also authorizes EPA to approve states to implement the minimum criteria for municipal solid waste landfills.

#### *Non-Hazardous Municipal Solid Waste*

EPA Household hazardous wastes, like mineral spirits and old paint, are not regulated under the Federal hazardous waste program. Many communities provide collection centers or pick-up services for the management of household hazardous waste. Generally, the only hazardous waste that municipal landfills can accept is household hazardous waste and waste from conditionally exempt small quantity generators.

### **The Universal Waste Rule**

In May 1995, the U.S. Environmental Protection Agency (EPA) promulgated the Universal Waste Rule to reduce the amount of hazardous wastes entering the municipal solid waste stream, encourage the recycling and proper disposal of certain common hazardous wastes, and reduce the regulatory burden on businesses that generate these wastes by simplifying the applicable regulations and making them easier to comply with. This rule recognized that some common hazardous wastes do not require the full array of hazardous waste collection and management requirements. It also eased the regulatory burden on waste handlers and transporters by streamlining a number of RCRA's hazardous waste collection and management requirements, including those related to notification, labeling/marketing, accumulation time limits, employee training, and offsite shipment, among others.

The Universal Waste Rule does not automatically apply in each state. In states authorized by the EPA to implement the Federal hazardous waste program, the rule is not applicable until those states revise their programs to adopt equivalent requirements under state law. Hence, manufacturers, transporters and recyclers theoretically may have to comply with varying, and sometimes conflicting, waste management regulations.

#### *Proposed Regulation of Cathode Ray Tubes*

CRTs are likely considered to be hazardous waste under Federal law when they are sent for disposal by non-household entities of entities generating more than 220 pounds of hazardous waste a month. According to a study of CRTs published by the University of Florida, the average concentration of lead in leachate from colored CRT glass generated through the EPA's TCLP was 22.2 milligrams per liter. This level is considerably above the toxicity characteristic regulatory level of 5 milligrams per liter that is used to classify lead-containing

wastes as hazardous. TCLP is a worst-case scenario test in an acidic environment designed to simulate landfill conditions.

In June 2002, EPA proposed a rule to streamline RCRA management requirements for CRTs going into recycling. Under the proposed rule, CRTs and the processed glass from CRTs would be subject to reduced requirements for storage, transportation and processing when sent for recycling. The purpose for the proposal is to encourage greater reuse, recycling, and better management of this growing waste stream. The rule is expected to be finalized in 2005.

### **The Taxpayer Relief Act of 1997**

The Taxpayer Relief Act of 1997 states that companies that donate personal computers to schools qualify for an enhanced charitable deduction benefit. The law, introduced by Representative Randy Cunningham (R-California), expanded tax incentives for private companies that donate computer technology, equipment, or software to K-12 classrooms. The act took effect January 1, 1998, and applies to computers less than two years old.

### **National Legislation Introduced in Congress**

Several bills were introduced in Congress relating to e-waste in 2005, include the ones described below. In May 2005, a new Congressional Working Group on Electronic Device Recycling was announced led by Congresswoman Bono of California, Congresswoman Slaughter of New York, Congressman Thompson of California, and Congressman Cunningham of California. Also in 2005, the House Energy and Commerce Committee, Subcommittee on Environment and Hazardous Materials, held the first Congressional hearing on e-waste July 20 and then held a second hearing on September 8. The Senate Environment and Public Works Committee, Subcommittee on Superfund and Waste Management, held an oversight hearing July 26. Statements from the many government, industry, and nonprofit witnesses are available on the Committees' websites.<sup>187</sup>

#### *Tax Incentives to Encourage Recycling (TIER) Act of 2005*

HR 4553, introduced by Representative Randy "Duke" Cunningham (D-California) in 2004, proposes to amend the Internal Revenue Code of 1986 to provide tax incentives to encourage manufacturers of computer and television equipment to operate an environmentally sound recycling program for use by consumers who want to discard equipment. This legislation would provide a recycling equipment credit, determined by the type of item, for central processing units (\$4), monitors (\$4), printers (\$4), mice and keyboards (\$1), and televisions (\$4). Reintroduced as HR 320 in 2005, it included cell phones and chargers (\$1).

#### *National Computer Recycling Act*

HR 1165 (National Computer Recycling Act), introduced by Representative Mike Thompson (D-California) in 2003, and reintroduced as HR 425 in 2005, would introduce a grant and fee program through the Environmental Protection Agency (EPA) to encourage and promote the

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<sup>187</sup> Find statements of witnesses at [energycommerce.house.gov](http://energycommerce.house.gov) and [epw.senate.gov](http://epw.senate.gov).



recycling of used computers. It would also promote the development of a national infrastructure for the recycling of used computers and other purposes. In particular, this legislation directs the Administrator of the EPA to require assessment of a fee to an end-user on the sale of any computer, monitor, or other designated electronic devices. This assessment would come after the EPA submits a study to Congress of the waste materials in used computers that may be hazardous to human health or the environment. Consumers would pay fees of up to \$10 each on these products. Fees collected would be used for the administration of this Act (a maximum of ten percent of fees to cover administration) and also would be used to finance grants for collecting or processing used computers, monitors, or other devices for recycling. In addition, it would be used to finance grants for reusing or reselling such products and extracting and using, or selling for reuse, raw materials from these products. There is a reporting requirement built into this legislation, which mandates reports to Congress on the status of computer recycling, which would include descriptions of fee collection and use.<sup>188</sup>

*The Electronic Waste Recycling and Promotion and Consumer Protection Act of 2005*

Senators Ron Wyden (D-Oregon) and Jim Talent (R-Missouri) introduced a bill in 2005 to offer tax incentives to recycle electronics and make recommendations for a nationwide recycling system. The proposed legislation would direct the EPA to conduct a cost-benefit analysis of various e-waste recycling programs, and to advise Congress on the feasibility of establishing a nationwide recycling program that preempts any state plan within one year. It would establish an \$8.00 per unit tax credit for companies that recycle at least 5,000 display screen or computer system units per year and a \$15.00 tax credit for consumers who recycle their old computers and televisions, provided they use qualified recyclers. It would ban disposal of any electronic equipment containing a display screen greater than four inches or any computer system unit in a municipal solid waste landfill, starting three years after the bill is passed, and is contingent on EPA's Administrator finding that a majority of U.S. households have reasonable access to e-waste recycling. It would also require Federal agencies to ensure that every display screen or system unit procured by the Federal government is recovered and recycled.

The Administration has not taken a position on any of these bills or the need for Federal legislation at this time.

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<sup>188</sup> Office of Representative Mike Thompson, Press Release on Legislation to Set Up Computer Recycling Program, July 18, 2002.

## APPENDIX III

### NATIONAL ELECTRONICS PRODUCT STEWARDSHIP INITIATIVE (NEPSI)

#### Background

The National Electronics Products Stewardship Initiative (NEPSI)<sup>189</sup> was created in April 2001 as a multi-stakeholder dialogue aimed at developing a national financing system to maximize the reuse and recycling of used televisions, monitors, computers, and associated computer accessories (i.e. mice, keyboards, printers, etc.)<sup>190</sup>. EPA initiated and funded the start of the dialogue. It was convened and facilitated by the University of Tennessee's Center for Clean Products and Clean Technologies (CCPCT).<sup>191</sup> NEPSI included representatives from multinational electronics manufacturers, representatives from state government, and representatives from recycling, environmental, and other groups. Participants in NEPSI, in a meeting on June 21-22, 2001, agreed by consensus that the group would promote product stewardship, which means that those involved in producing, selling, or using a product have a role in managing it at the end of its useful life.<sup>192</sup> The group also advocated the principle of shared responsibility by all parties for the management of end-of-life electronics.

The participants in the NEPSI dialogue agreed to meet six times over the course of the next year, with these meetings rotating around the country to incorporate the participation of state and local agencies.<sup>193</sup> NEPSI divided the group into a Stakeholder Group, which was made up of representatives from all participants in the NEPSI process, and a Core Group. Subgroups were also created, which dealt with specific issues such as financing; regulatory issues; and collection, reuse, and recycling infrastructure, among other topics.<sup>194</sup> The work of these subgroups was reported at subsequent meetings and proposals and/or issues were voted upon by the assembled group of stakeholders. Stakeholders met 13 times through February 2004, with eight meetings comprised of the entire stakeholder group, as well as holding numerous conference calls.

Initially, the dialogue explored the possibility of whether voluntary programs could provide a solution. As the dialogue evolved to the point where the stakeholders were seriously considering a joint effort to lobby for Federal legislation, EPA withdrew its participation and funding out of concern that its continued involvement would raise questions with anti-lobbying restrictions applicable to EPA staff and EPA grantees. The NEPSI dialogue continued with alternative funding in 2004. The decisions and views of NEPSI described

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<sup>189</sup> Further information and documents related to NEPSI can be found at [www.nepsi.org](http://www.nepsi.org).

<sup>190</sup> National Electronics Products Stewardship Initiative (NEPSI), NEPSI Draft Meeting Notes: June 21-22, 2001 Meeting in San Francisco, CA, p. 2, [www.nepsi.org](http://www.nepsi.org) (November 10, 2004).

<sup>191</sup> For more information see [www.cleanproducts.org](http://www.cleanproducts.org).

<sup>192</sup> NEPSI Draft Meeting Notes: June 21-22, 2001, pp. 2-3.

<sup>193</sup> NEPSI Press Release, June 29, 2001.

<sup>194</sup> NEPSI, Roadmap for NEPSI Process Draft October 9, 2001.

below do not represent those of the U.S. Department of Commerce or the Administration, which has not taken a position on these issues.

## **12 Models for a National Financing System**

The main goal for the NEPSI discussions is reflected in an agreement from its June 22, 2001 meeting: “the development of a system, which includes a viable financing mechanism, to maximize the collection, reuse, and recycling of used electronics, while considering appropriate incentives to design products that facilitate source reduction, reuse, and recycling; reduce toxicity; and increase recycled content.”<sup>195</sup> In keeping with this goal, the group discussed many different models on how to structure a national financing system for reusing and recycling electronics products. NEPSI started with as many as twelve models, with systems ranging from a consumer mail-in program, to a deposit/refund system, to a producer-administered fund. What follows are brief descriptions, as well as advantages and disadvantages expressed by the NEPSI stakeholders of the original 12 models that were considered.<sup>196</sup>

### *General Tax Based Funding*

Under this model, the public would pay for the state/local government to collect, transport, and recycle electronics products through a tax or monthly fee. The government would collect and transport the products and recycle them either through a contractor or their own facilities. This model, using general tax based funding, could be easily implemented, as there is the potential to include electronics recycling as part of residents’ monthly waste collection fees. However, this model shifts the end-of-life costs of electronics products to taxpayers, rather than the consumers of the products.<sup>197</sup>

### *Government/Retailer Collection, Producers Transport & Recycle*

In this model, the collection, transport, and recycling is financed through either a fee at the point of sale of new products or a payment at the time of recycling. Under this system, governments, retailers, and contractors would collect the products with taxpayers or the consumers paying for the service. As mentioned, taxpayers would pay either through a tax or a monthly fee, or consumers would pay through a fee at the time of drop-off. Producers or contractors would transport and recycle the products, with producers providing financing for these services. Producers would pay for transport and recycling either with a fee on the sale of new products or by internalizing the cost.

### *Government/Retailer Collection, Contractor Transport & Recycling*

In another model discussed by NEPSI, the government and retailers would collect electronics products with the consumer paying a fee at the time of disposal. This fee would be paid at the collection site and a contractor would be responsible for transporting and recycling the products. The disposal fee paid by the consumer would pay for collection, transport, and recycling costs.

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<sup>195</sup> NEPSI, Roadmap for NEPSI Process Draft October 9, 2001, p.1.

<sup>196</sup> NEPSI, Models of Collection, Transport, Recycling and Financing.

<sup>197</sup> NEPSI, Summary of NEPSI Stakeholder Comments on Financing Models.

### *Consumer Mail-In Program*

This model involves a mail-in program for consumers to return their electronics products to the producer or a contractor. The producer or contractor would collect the products via mail with the consumer paying a fee at the time of mail-in that would finance the collection, transport, and recycling of the products. The benefit of this model is that it provides opportunities for collection of electronics products in rural communities as well as for elderly or disabled persons. However, a mail-in program does not support local processing of products and could be quite expensive unless there are regional recycling facilities available.<sup>198</sup>

### *Advanced Disposal Fee Finances Entire System*

Under this model, the consumer would pay for the collection, transport, and recycling of electronics products through an Advanced Disposal Fee (ADF) included in the purchase of new products. Governments, producers, and/or contractors would collect, transport, and recycle the products, all of which are funded by the ADF paid by consumers.

### *Deposit/Refund System*

This model is a deposit/refund system, which would involve the consumers making a deposit at the time of purchase of a new product, and in a refund upon return the product. The refund would be less than the deposit, thus funding the system. The governments and retailers would collect, while governments, retailers, and/or their contractors would transport the products to recycling centers. Producers and/or their contractors would recycle the products.

### *Retailer Collection, Shared Costs with Producers*

In this model, the retailers and/or their contractors would collect products at their locations and transport them, with producers and/or their contractors recycling the products. This system would involve shared costs between producers, retailers and consumers, with the consumers paying a fee at the time of drop-off and retailers/producers charge a fee on the purchase of new products to cover the system. Consumers would return their products to retail locations for collection and transport to producer/contractor recycling facilities, and fees paid by retailers, consumers, and retailers would finance the system.

### *Producer Administered Advanced Recovery Fee System*

This model involves a system which would be administered by the producers and financed by an advanced fee at the time of purchase. For example, governments and retailers would collect the products and would be reimbursed by a fund setup by the producers. This fund would also provide financing for producers and/or their contractors to transport and recycle these products.

### *Government Collection & Transport, Recycling by Producers*

This model involves a system in which the government collects and transports e-waste and the producers recycle. Under this system, the government or contractor(s) would collect and transport the products. Collection and transport would be financed through a tax, a monthly fee on the taxpayer, or a drop-off fee on consumers at the time of drop-off. Producers would

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<sup>198</sup> NEPSI, Summary of NEPSI Stakeholder Comments on Financing Models.

recycle these products at their expense. The producers have the option, under this system, of internalizing the cost or increasing the price of products to the consumer.

This system could take advantage of existing local government infrastructure for collection and transport. However, there were concerns that the existing infrastructure might not be suited for the influx of electronics products that would occur under this system. Other benefits of this system that were identified were that it would be a familiar system to consumers, producers, and government. It would also shift the responsibility for recycling to producers, which could encourage design for environment changes. But there were also concerns that this system could increase the tax burden on state governments, that there is no incentive to make the entire system economically or environmentally efficient, or that end-of-life fees may encourage illegal dumping or disposal of products.<sup>199</sup> The end-of-life fees would also be innately regressive in that lower income users and charities might often be the ultimate end-user and thus would have to fund the majority of the nation's recycling.<sup>200</sup>

#### *Advanced Recovery Fee Finances Collection & Transport*

Under this model, financed through an Advanced Recovery Fee (ARF), the government and retailers collect and transport products, with producers responsible for recycling. The consumer would pay an ARF at the point of purchase of new electronic products and these fees would go into a fund that would pay retailers and/or government for the collection and transport of old products to recycling centers. The producers would cover the costs of recycling, either by recycling themselves or paying a contractor. Since the producer is responsible for recycling, it provides incentives for producers to design products that are more easily recycled. This model also does not require a consumer drop-off fee or an end-of-life fee, which would be convenient for consumers, and shifts costs from the taxpayer to the consumers and producers.

On the other hand, there were concerns with this model as it breaks the system of collection, transport, and recycling into different cost components, which adds complications.<sup>201</sup> Another major concern with this system is that the system does not take advantage of market forces: there is no incentive built into the system that maximizes the strengths of recycling infrastructure. Furthermore, the system does not deal with historic/orphan waste products. The system would also require legislation to levy a consistent national fee at the point of sale.<sup>202</sup>

#### *Deposit Refund System Finances Collection & Transport*

The financing system under this model would be a deposit/refund system, which would pay for collection and transport, while the producers would be responsible for recycling. The consumers would pay a deposit fee on the purchase of new products and would receive a

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<sup>199</sup> NEPSI, Models of Collection, Transport, Recycling and Financing: Pro's/Con's Identified at the June 21-22 NEPSI Meeting.

<sup>200</sup> NEPSI, Summary of Stakeholder Comments on Financing Models, June 22, 2001.

<sup>201</sup> NEPSI, Summary of Stakeholder Comments on Financing Models, June 22, 2001.

<sup>202</sup> NEPSI, Models of Collection, Transport, Recycling and Financing: Pro's/Con's Identified at the June 21-22 NEPSI Meeting.

lesser refund when returning the product, thus financing collection and transport. Governments and retailers would collect the products; governments, retailers, and/or contractors would transport the products to recycling centers. The producers or contractors would be responsible for the recycling, which producers would fund either through a fee included in the purchase price of new products or internalizing the cost.<sup>203</sup>

One possible benefit of this model is that it provides a refund, which could encourage consumers to return products. This system is also familiar to consumers as it is used with bottles, and as with bottles, the system might encourage collection and discourage illegal dumping. With electronics products, however, it would be easier to track brands and administer the system than in a bottle system. On the other hand, there was concern that this program would be overly bureaucratic, as it requires multiple levels of administration.<sup>204</sup> There is also the issue of breaking the system down into different cost components, which adds complications.<sup>205</sup> Also, with this system there is a time-lag issue as electronics and historic waste are not returned in a matter of weeks, as with bottles, but in a matter of years and this could bankrupt the system if it is not sustainable. The issue of how to apply this system to Internet sales is an additional concern; it would require legislation both to set up the fee and to address Internet sales. This model also reduces the incentive for producers to design products for the environment and may not be as flexible a system as other options.<sup>206</sup>

### *Producers Finance Collection, Transport, & Recycling*

This model involves a system where the producer pays for the collection, transport, and recycling of electronics products. It would be funded by the producers either imposing a fee on the consumer on the purchase of new products or by producers internalizing the cost. Governments, retailers, and/or contractors would collect the products, with the producers and/or their contractors transporting and recycling the products. This model uses price mechanisms as a consumer signal; it could drive consumer education by the imposition of a fee on the product at time of purchase. It also incorporates mechanisms to encourage producers to design products for the environment.

Some concerns expressed with this system were that it does not incorporate a role for an informed consumer, it does not bolster the economic base for recycling in the U.S, there is less of a role for government to develop a consumer education campaign on recycling products, and that there is not a shared responsibility for collection, transport, and recycling costs.<sup>207</sup>

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<sup>203</sup> NEPSI, Summary of NEPSI Stakeholder Comments on Financing Models.

<sup>204</sup> NEPSI, Models of Collection, Transport, Recycling and Financing: Pro's/Con's Identified at the June 21-22 NEPSI Meeting.

<sup>205</sup> NEPSI, Summary of NEPSI Stakeholder Comments on Financing Models.

<sup>206</sup> NEPSI, Models of Collection, Transport, Recycling and Financing: Pro's/Con's Identified at the June 21-22 NEPSI Meeting.

<sup>207</sup> NEPSI, Models of Collection, Transport, Recycling and Financing: Pro's/Con's Identified at the June 21-22 NEPSI Meeting.



## **Hybrid Advanced Recovery Fee/Partial Cost Internalization Model**

Following the June 2002 meeting, the NEPSI group tasked a smaller, representative group of stakeholders (referred to as the “G12”) to come up with compromise financing models, derived from the discussions of the 12 models. During the course of nine months, the G12 distilled the models down to four: an advanced recovery fee system, a partial cost internalization system, a concurrent systems model (which would allow manufacturers to select either the ARF or PCI system), and a hybrid of advanced recovery fees and partial cost internalization.<sup>208</sup> Upon analysis of the four models, the stakeholders decided that the concurrent systems model was far too complex, and chose the hybrid model as the most likely model for NEPSI stakeholder consensus.

The hybrid model incorporates both an Advanced Recovery Fee (ARF) system, with the option for an Alternative System and a transition into a Partial Cost Internalization (PCI). This model envisions that after a national ARF system has been in effect for seven years, the Environmental Protection Agency (EPA) would convene a multi-stakeholder panel to review and assess the demonstrated benefits of the ARF. Following this panel, recommendations would be made to the EPA regarding a transition into a PCI system.<sup>209</sup>

The ARF, which would not exceed \$10 per product, would be assessed on all NEPSI products (enumerated in the February 26, 2004, NEPSI Compromise Resolution, including used televisions, monitors, computers, and associated computer accessories such as mice, keyboards, printers, etc.) sold in the United States regardless of manufacturer and type of sale, unless the manufacturer is operating under an approved Alternative System. NEPSI stakeholders understood that Federal legislation would be required to implement the ARF on a national level. Not only would legislation be required to apply the fee but to apply it across the board and limit free riders within the system. The ARF on TV’s and computers would be higher to subsidize smaller items and the ARF would be sufficient to cover products of participating manufacturers as well as orphan products in terms of collection, transportation, and processing. Upon collection, a non-governmental Third Party Organization (TPO) would deposit the fee into a trust account, which would be separate from the Federal Government Treasury, and managed by the TPO. This TPO would have the authority to recommend a reduction in the ARF but not an increase, as the fee could not be increased above \$10. The TPO would be required to be a nonprofit organization that would be managed by a Board of Directors appointed by the EPA Administrator. The TPO’s ARF account would be audited annually and a copy of the audit would be submitted each year on 30 June to the TPO, EPA, and Congress. In conjunction with the audit, the TPO would further prepare its own report regarding the Trust Fund balance; the volume of NEPSI products collected and processed, the ability of the current fund to meet processing needs, and other responsibilities.<sup>210</sup>

A producer that would prefer to forego an ARF on its products would have the option of implementing an Alternative System. It would submit its plan for approval to the appropriate government agency, most likely the EPA. The proposal would have to outline a system

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<sup>208</sup> NEPSI, Brief Summary of Frameworks.

<sup>209</sup> NEPSI, NEPSI System Transition.

<sup>210</sup> NEPSI, Meeting Notes of the Full Stakeholder Group, Portland, Oregon, February 10-11, 2004.



equivalent to the ARF base level of service and would include some responsibility for orphan products. For example, a particular company would have to demonstrate that its program would collect its own products plus an appropriate share of orphan electronics and would also have to internally fund all orphan associated costs that would have previously been funded by the ARF. In addition, the Alternative System would have to resolve the disparity in equivalence, as the ARF system is proportional to sales while the Alternative System is proportional to collection levels.<sup>211</sup>

Under PCI, producers would be responsible for funding transportation from a point of consolidation and funding the actual processing of products. In theory, an ARF would provide funds needed to jump-start the recycling effort and handle a majority of orphaned products, but through the eventual transition to PCI, it would also provide competition to lower costs and promote DfE. However, there is the likelihood that orphan products will still exist after the transition to a PCI system so the responsibility for these goods would somehow have to be divided amongst manufacturers. Additional concerns with this system mirror concerns with similar models such as how the ARF will be enforced on Internet sales and how the ARF will be applied to products sold in the U.S. by foreign-owned companies. There are also the issues of which entity will regulate the collection of products and where it will occur (curbside pickup, drop-offs, retailers, etc.). Another potential concern is if an ARF will be enough to fund adequate and efficient collection, transport, and recycling of products. An additional issue is under what conditions the EPA would recommend transition to a PCI system rather than an ARF system, and what timeline and procedure is to be followed for the transition to a PCI system. A final consideration is related to the measurement and standardization of commodities recycled and how to compare success between systems if companies opt to use an Alternative system rather than the ARF system.<sup>212</sup>

While the Hybrid System was selected as the most likely system for NEPSI consensus, there were some disagreements among the NEPSI stakeholders over the financing system mentioned above.<sup>213</sup> NEPSI's last meeting was convened on February 10-11, 2004, where it adopted a Compromise Resolution on the NEPSI financing model, reprinted below. The Stakeholders agreed to reconvene after industry reached an agreement on the financing method. The Compromise Resolution<sup>214</sup> below was agreed to by NEPSI participants and does not reflect the views of the Federal Government.

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<sup>211</sup> NEPSI, Meeting Notes of the Full Stakeholder Group, Portland, Oregon, February 10-11, 2004.

<sup>212</sup> NEPSI, Meeting Notes of the Full Stakeholder Group, Portland, Oregon, February 10-11, 2004.

<sup>213</sup> NEPSI, Meeting Notes of the Full Stakeholder Group, Portland, Oregon, February 10-11, 2004.

<sup>214</sup> NEPSI Compromise Resolution, February 26, 2004.

*This document is subject to change by the NEPSI participants.*

**NEPSI Compromise Resolution**

**2/26/04**

Based on the information and knowledge gathered during the three years of study and deliberation of the National Electronics Product Stewardship Initiative (NEPSI), the NEPSI group at the February 10/11, 2004 meeting in Portland, Oregon, adopts the following resolution:

**Whereas**, the University of Tennessee Center for Clean Products and Clean Technologies, under a cooperative agreement with EPA, convened the NEPSI process with an unprecedented group of multi-stakeholders covering a range of interests in electronics stewardship including manufacturers, recyclers, state and local governments, environmental organizations, academia and others to provide guidance on the development of a national system for electronics management;

**Whereas**, it is the desire of the NEPSI group to establish a national system to collect, transport and process consumer electronics in a manner that is protective of human health and the environment, and one that is economically sustainable and market driven;

**Whereas**, the NEPSI group has explored a broad range of issues, options and approaches to developing such a national system through the eight formal NEPSI meetings, countless conference calls, technical working documents and other communications during the past three years;

**Whereas**, this resolution builds upon approaches outlined in the technical working documents developed during the NEPSI process, including the document currently referred to as the Memorandum of Understanding (MOU) and other technical working documents attached thereto; and

**Whereas**, the NEPSI process has concluded with agreement on many of the principles that must be incorporated into a national electronics management system. The NEPSI participants acknowledge that there are important issues, including details of the financing mechanism, which remain to be finalized.

**Therefore,**

**Be it resolved** that the NEPSI group adopts this resolution as guidance on establishing a national electronics management system, and recommends and supports the creation of such a system to ensure a level playing field and the environmentally sound management of used electronics provided that the first action to be undertaken and resolved is the following:

--industry finalizes a consensus agreement on a financing model supported by a significant portion of the market share of both the information technology (IT) and consumer electronics (CE) sectors.

--the proposed industry financing model shall cover the following scope of products as endorsed by the NEPSI stakeholders on February 10, 2004.

TV/TV Monitors (CRTs and flat panels)

Stand alone computer CRT and flat panel monitors greater than 9 inches

Laptop/notebook computers

CPUs

Small peripherals (mice, keyboards, cables, speakers) [no fee]

Consumer desktop devices (printers and multifunction devices)

--the industry financing model is vetted through a process to be determined to decide whether and when to reconvene and complete work on the national system.

Provided further that work will commence on all remaining NEPSI technical working documents and issues once this financing model has been accepted by the NEPSI stakeholders.

**Be it further resolved** that the industry representatives will draft and circulate among the NEPSI Stakeholders another technical working document providing further specificity on the interface between the alternative system principles and the advanced recovery fee (ARF)/hybrid, which will outline specific criteria to provide an equivalent level of service to the NEPSI System consistent with the base level of service technical working document. This document will make and clearly describe the assumptions on which the financing model is based.

**Be it further resolved** that in order to fully recover the bulk of orphaned and historic NEPSI Products, the NEPSI Participants support implementation on a national basis of an ARF-driven system which is flexible enough to allow for an Alternative System that permits individual manufacturer responsibility as set forth in the draft MOU dated February 6, 2004, without undermining the financial viability of the ARF system. It is further the intent of the NEPSI System that the ARF-financed components of the system transition to a Partial Cost Internalization (PCI) System pursuant to an agreed upon time schedule and process as set forth in the draft MOU and technical working documents attached and referenced therein.

**Be it further resolved** that through the NEPSI process, participants have developed a number of technical working documents including the Alternative Stewardship Principles, a draft MOU dated February 6, 2004, and related background documents. Though these documents have not been fully vetted, and in some cases not fully completed, they embody many of the parameters of a national system.

**Be it further resolved** that upon reconvening, the NEPSI group shall finalize the following documents and take the following actions:

- Performance measures document;
- Memorandum of Understanding, including exhibits;
- National uniformity document;
- Alternative stewardship principles document; and

Scheduling of a meeting to discuss formation of a National Coordinating Entity as articulated in the Interim Program technical working document.

Industry stakeholders worked diligently on a compromise financing mechanism, but were unable to deliver a system back to the NEPSI stakeholders. Thus, the dialogue could not be reconvened in a timely fashion to negotiate a final agreement for a national system. The February 2004 meeting remained the last meeting of the NEPSI dialogue.

Despite the lack of resolution on a national system, the stakeholders reached consensus on a number of critical issues necessary in a national system over the course of three years' work. This included a scope of products, environmentally sound management procedures, market development opportunities, a base-level of infrastructure, and aspects of a third-party organization. In addition, the NEPSI process generated a tremendous amount of data about electronics management that continues to inform the e-waste discussion in the United States.

## **APPENDIX IV**

### **GOVERNMENT AND INDUSTRY ACTIVITIES**

Below are some of the major activities undertaken by the Federal Government and industry to address electronics recycling. There are numerous other efforts, particularly at the local level by industry, state and local governments, and non-profits, which are not all described here.

#### **The EPA eCycling Pilot**

In 2000, the Philadelphia EPA (Region 3) and the environmental agencies of the Mid-Atlantic states (Delaware, Maryland, Pennsylvania, Virginia, and West Virginia) and the District of Columbia (DC) joined forces with electronic manufacturers to find a sustainable approach to remove end-of-life computers and televisions from the municipal waste stream. Through the Region 3 eCycling Pilot, government and industry collaborated to demonstrate the feasibility of a multi-state, public/private, residential electronics collection, reuse, and recycling program that is based on a model of shared responsibility among government, industry, and consumers.

The intent of eCycling was to collect empirical data on the cost of managing end-of-life electronics as well as to divert electronics from the waste stream for recycling and reuse. Additionally, organizers sought to learn how to harmonize regulations across state boundaries and to test the use of a third party organization to manage private-sector contributions.

At its conclusion on December 31, 2002, the eCycling Pilot had sponsored 58 residential electronics collection events and 9 permanent collection programs. It collected over 2,700 tons and diverted more than 26,000 cathode ray tubes (CRTs) from televisions and computer monitors from the municipal waste stream.

The largest recyclers for the eCycling Pilot were Envirocycle, Inc. of Hallstead, Pennsylvania, and Elemental, Inc. of Philadelphia, Pennsylvania. The EPA contracted electronics recycler was Envirocycle, Inc., while Elemental, Inc. provided recycling services for the Delaware drop-off program.

For Envirocycle, average collection, transportation, and recycling costs were \$0.06 per pound, \$0.04 per pound, and \$0.14 per pound respectively. The contracted rate for Envirocycle was \$0.25 per pound and included “turn-key” electronics collection and recycling services, ensured domestic dismantling, and ensured the use of safe environmental and human health management practices. Overall pilot costs were approximately \$1.1 million and an average of \$0.20 per pound.

According to the report, key lessons learned from the 58 one time events, 1 state wide/permanent collection program, and 8 county wide permanent collection programs held over the 14-month period were that aggressive advertising was critical to the success of all

the eCycling events and programs. The residents who attended the collection events expressed a willingness to pay a small end-of-life fee of \$2 or \$5 per item. Permanent collection programs were more cost effective than single day events. The eCycling Pilot was a catalyst in expanding electronics collection opportunities for residents and small businesses in the Mid-Atlantic states. One local government in Pennsylvania and one in Maryland each started a permanent collection program as a result of eCycling. The permanent collection program in Delaware demonstrated that a consistently high volume of residential and small business electronics is available for collection and recycling. Delaware's monthly pickups exceeded 100,000 pounds each month and averaged 160,000 pounds per month.

The major accomplishments of the Region 3 eCycling Pilot were:

- Development of a unified end-of-life electronics across state boundaries in the five Mid-Atlantic states and DC.
- Partnerships with electronics companies who helped cover some of the costs to operate the Pilot
- Partnership with a third-party organization who managed the financial contributions from the private sector, and helped with data management and analysis
- Establishment of a contracted vehicle (via the US Army Corps of Engineers) through which 4 states and DC could use public sector funding
- Expansion of the electronics recycling infrastructure throughout the Mid-Atlantic region.<sup>215</sup>

### **EPA's Plug-In To eCycling Campaign**

Launched in January 2003, the Plug-In to eCycling is one of the EPA's Resource Conservation Challenge efforts. Plug-In strives to increase Americans' opportunities to recycle unwanted electronics and their awareness of the need to do so. Plug-In accomplishes this by partnering with manufacturers, retailers of consumer electronics, and local governments to provide recycling opportunities for citizens. Plug-In also partners with these players to test new models for collecting electronics from consumers (e.g., retailer-based, in-store takeback). Finally, Plug-In has crafted safe management guidelines for electronics recycling for use by Plug-In partners and any others who wish to ensure that their electronics are properly managed. Plug-In partners include: Apple, Best Buy, Brother, Cingular, Dell, eBay, Epson, Hewlett-Packard, Intel, JVC, Lexmark, NEC Display, Office Depot, Panasonic, Pioneer, Philips, Samsung, Sharp, Sony, Staples, and Toshiba. Good Guys retailer was a partner until 2005 when the company was sold.

### **Guidelines for Plug-In To eCycling Campaign**

EPA developed environmentally sound management (ESM) guidelines for the management of "end-of-life" electronics for its Plug-in Program, called "Guidelines for Materials

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<sup>215</sup> Available at: <http://www.epa.gov/epaoswer/osw/conservation/plugin/index.htm>.

Management” (reproduced at the end of this Appendix). The Plug-In campaign and pilot programs provided a test for the guidelines and they were used as a framework for considering the acceptance of partners to the Plug-In Campaign.

The guidelines were written to address reuse, refurbishment, and recycling/disposal, not to specifically address collection activities. Under these guidelines, the Plug-In partner ensures that these practices are utilized to the greatest possible extent for all electronics, and if incineration or landfilling is unavoidable, the partner must consider whether the waste has value for energy recovery, must manage waste safely at fully licensed facilities, and must comply with all federal and state requirements. If any electronic products or components are exported, the partner must comply with all applicable requirements of the United States as well as those of importing and transit countries. Additionally, any of the following materials are to be removed and handled separately unless the export is to be used for refurbishing or reuse, or the partner has ensured that these materials will be removed in OECD member countries: batteries, mercury and PCB containing lamps, devices, circuit boards (unless contained in hand-held equipment), and CRT/CRT glass.

For materials designated for reuse or refurbishment, the Plug-In partner ensures that all items in the shipment meet legitimate specifications as well as the specifications of the consignee, all items are packaged in a manner consistent with preservation of the used equipment for reuse/refurbishment, and proper records are maintained. For recyclable materials, the partner ensures records demonstrating that downstream processing and recycling operations adhere to the following five guidelines:

- Facilities are fully licensed by all appropriate governing authorities,
- Facilities have an environmental management system in place,
- Facilities safeguard occupational and environmental health and safety,
- Facilities track key process parameters, compliance with safety procedures, effluent and emissions, and incoming/stored/outgoing materials and waste,
- Facilities have an adequate plan for closure.<sup>216</sup> See Appendix for a complete copy of the guidance.

### **EPA Plug-In Program Pilots**

*Partnership between Good Guys, Pacific Northwest Local Governments and EPA Region 10*  
In Washington, King County, Snohomish County, Pierce County, the City of Seattle, and the City of Tacoma joined with Good Guys and six electronics manufacturers to hold a one-month television recycling program at Good Guys stores in Bellevue, Tukwila, Lynnwood and Puyallup between July 8 and August 7, 2004. Consumers could bring one television per customer to a participating Good Guys store and leave it to be recycled by paying a fee: \$25 for console televisions and \$10 for all other televisions. Consumers received a 10 percent discount on the purchase of any television by the participating manufacturers: JVC, Phillips, Pioneer, Samsung, Sharp, and Sony. Program organizers estimated that the fee accounted for

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<sup>216</sup> Available at: <http://www.epa.gov/epaoswer/osw/conservation/plugin/guide.htm>.



approximately 50 percent of the cost of the recycling. Existing local programs for television drop-off cost up to \$50 a unit. Television brands were recorded, but not sorted and not returned to the manufacturers. All went to a local recycler.<sup>217</sup> Over 4,000 televisions were collected (over 197,000 pounds).

*Partnership Between Staples and the Product Steward Institute in New England*

Starting in late May 2004, Staples Inc. partnered with the Product Stewardship Institute (PSI) launched a six week pilot program to measure the success of retail-based electronics recycling. PSI is a national organization that seeks to reduce the health and environmental impacts of consumer products. The pilot's goal is to test and measure the reverse distribution process as a unique strategy for transporting old computers and other business equipment from consumers to recyclers. The planned process used the same channels that provide the new products to customers to collect and transport the old electronics to the distribution centers. The pilot included 25 collections at retail stores in the Dayville, Connecticut, distribution network and 24 collections from Internet or catalog customers serviced by the North Reading or Sharon, Massachusetts, delivery hubs. In all, 115,029 pounds of electronics were collected.

In this pilot project, Staples collected and recycled old computers, peripherals, and office equipment from its customers. Staples provided the labor, transportation equipment, and storage capacity for the pilot. Participating manufacturers shared the costs of transporting used electronics from consolidation points to the recycler, as well as paying a share of the recycling costs. Local and state government agencies also assisted in designing the project, and promoted the collections. PSI's role was collecting data from Staples' retail and delivery operations.

PSI released a report that analyzes the lesson learned during the program in 2005.<sup>218</sup>

*EPA Nationwide Office Depot and Hewlett-Packard Pilot Program*

Office Depot, and Hewlett-Packard (HP) partnered for a nationwide pilot to recycle a limited number of consumer electronics, including computers, televisions under 27 inches, cell phones, pagers, and PDAs. Consumers could take one product per day to an Office Depot and drop off their product with no fee. All the products, regardless of make, were transported to HP recycling centers. HP covered all the recycling costs and Office Depot covered all the collection costs. Interestingly, two cities in Washington have curbside collection of electronics with no fee and other local governments have continuous drop-off centers, some with fees, yet consumers still brought products into the local Office Depot.<sup>219</sup> More than 10,500,000 pounds (over 325,000 units) were collected, which is equal to more than 441 tractor trailer loads. The Northwest Product Stewardship Council is working with Office Depot to analyze the program and plans to release its findings.<sup>220</sup>

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<sup>217</sup> EPA press release & Lynn Williams, EPA Seattle Region 10.

<sup>218</sup> See <http://www.productstewardship.us/displayPage.php?pageid=126>.

<sup>219</sup> EPA press release & Lynn Williams, EPA Seattle Region 10.

<sup>220</sup> See <http://www.productstewardship.net>.

Partnership Between Minnesota Office of Environmental Assistance, Best Buy, Target, Recycle America Alliance and Asset Recovery Corporation

In light of Minnesota's passage of a landfill ban for cathode ray tubes (CRTs), a pilot project to test the potential to institutionalize episodic, retailer-based collections was initiated. From May to October 2004, this pilot looked for viable shared-responsibility solutions for old consumer electronics. It did this by testing the practicality of retail-based collection strategies with no fees or a minimal fee paid by the consumers at the point of collection, and also testing ways in which retailers and manufacturers can collaborate to create sustainable recycling systems. Best Buy offered one or two day collection events in the Twin Cities metropolitan area and in Wisconsin.

Under the program, contributing manufacturers paid for the processing of their own branded products and for a portion of the cost of transportation to the recycler. The retailer paid for collection costs and outreach. The consumer paid an end-of-life fee to cover the remaining pilot costs.<sup>221</sup> In total, 357,526 pounds were collected.

### **Regional Take It Back Network- Local initiative in the Pacific Northwest**

As electronic waste has become an increasingly important issue, Snohomish County, Washington, has actively sought to establish an effective product stewardship type system for the management of electronic products. In 2002, the County established the Take it Back Network, a number of private businesses that have agreed to provide collection locations and recycling/processing services. The County has also established e-waste recycling at three of its transfer stations where it charges an end-of-life fee.

Additionally, some electronic manufacturers began offering limited "take-back" programs to their customers nationally. Most of these programs involve mailing the products to the manufacturer, which will then provide or arrange recycling. In the beginning, the County promoted the use of these programs, however, it became unclear how practical and effective these programs were in providing services to citizens or accomplishing the needed collection and recycling of electronic waste. Furthermore, preliminary tests of existing manufacturer take-back programs by the county staff indicated that they were confusing, time consuming, and expensive.

Consequently, in 2002, Snohomish County hired the marketing consulting firm, PRR, to test the current electronic take-back programs offered by computer manufacturers. A PRR research associate conducted "secret shopper" research with five manufacturer programs including IBM, HP, Dell, Gateway, and Lexmark. By employing a secret shopper technique, PRR was able to assess each of the five manufacturer take-back programs. This technique involved conducting an information search using the web, email, and toll-free numbers for each manufacturer to learn about their take-back programs and how to get a computer system recycled. PRR tested the manufacturers on the following items:

- 1 13" monitor

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<sup>221</sup> EPA, <http://www.epa.gov/epaoswer/osw/conservation/plugin/minnesota.htm>.

- 1 central processing unit (CPU), standard size tower
- 1 Inkjet printer, small HP model
- 1 Keyboard & Mouse

The goal of this research was to test the convenience, information accuracy, time expenditure, and cost of each of these manufacturer provided programs. At the end of the study, PPR came to five key conclusions.

1. IBM, HP and Dell offer take-back services that are similar in scope and cost. All brands of equipment are accepted. Average cost for recycling a complete computer system is approximately \$68.00, inclusive of shipping materials, although Dell had a limited time 50% off recycling offer in place at the time of the research. The consumer orders the service via Internet, phone or email. The consumer must package up the computer equipment, put it out on the front porch and wait for a shipper to pick it up.
2. Lexmark offers free recycling, but only for Lexmark products. The consumer must also bear the costs of packaging materials and shipping. This may work well for small printers, but in the case of this research project, a large desk Lexmark printer was recycled that required \$40 in shipping costs and \$10 worth of packaging.
3. Each manufacturer take-back program requires time to search an Internet site, make phone calls or send emails for information. Information derived from these sources was not consistently reliable. It was sometimes good, sometimes fair, sometimes poor and sometimes simply unavailable.
4. Gateway does not actually offer a take-back program, but refers customers to other available recycling options. The information provided by Gateway was outdated, since it initially directed the researcher to local charities that no longer accept electronics for recycling. However, using links on the Gateway site, the researcher was eventually able to recycle her computer via a Snohomish County “Take IT Back Network” private-sector collection site that had partnered with local government.
5. The private-sector Take It Back Network collection site offered the cheapest, easiest, and most convenient way to recycle. It cost approximately \$15 to recycle an entire computer system, including printer. It did not require waiting for a recycling package, label and instructions; sourcing packaging and boxing up the equipment; or waiting for a shipping company to pick up the equipment. All that was required was a drive to the collection site.

The Snohomish County test of manufacturer take back programs concluded that these programs were high cost, and lack the element of relative convenience and required substantial time commitment to recycle a computer. The report argued that manufacturer

programs needed to improve significantly in terms of cost and ease of use if mail-back services are expected to serve any meaningful role in the collection of obsolete products.

The report recommends that improvements to existing take back programs include significant cost reduction, easy to find and use recycling information and websites; better training for customer service representatives, effective email query management, and clear information on options and costs. Furthermore, in order to develop effective manufacturer take-back programs, the report recommends that manufacturers may need to finance “brick and mortar” recycling drop of locations by partnering with local retailers, businesses, charities and government services. The advantage, PRR argues, would be decreased cost to the consumer and manufacturer and increased convenience, yielding higher recycling rates.<sup>222</sup>

Results of the test and recommendations were provided to these manufacturers. By the time the report was officially released, several of the programs had undergone significant changes and improvements.

### **Best Buy Pilot**

In August 2004, six Best Buy stores in the Indianapolis area served as recycling drop-off points for many consumer electronic items. Best Buy collected: computers, monitors, printers, fax machines, TV’s (up to 27”), stereos, VCRs, DVD players, and camcorders. The goal of the program was to provide consumers with a convenient and safe way to recycle their household electronics.<sup>223</sup>

### **WasteCap, EIA, Goodwill, and Retailers Pilot**

In December 2003, EIA, WasteCap, Goodwill Industries and the Retailers Association of Massachusetts kicked-off a voluntary electronics recycling pilot program, “Recycle Electronics for Charity,” to encourage consumers in the Bay State to recycle their used computers and televisions and donate them to Goodwill Industries.<sup>224</sup> That charitable organization in turn distributed the donated goods to those in need or recycled them. Under the pilot program, Goodwill will work closely with WasteCap, a non-profit, public/private partnership designed to develop and implement cost-effective recycling, reuse, and waste reduction programs for businesses. Goodwill Industries and WasteCap will oversee the collection, recycling, and distribution of the donated electronics at two Goodwill Industries pilot program sites in Massachusetts. EIA member companies and partnering organizations will contribute to the funding and implementation of the program, which also has support from the Massachusetts Department of Environmental Protection. The pilot is supported and funded by Apple, Canon USA, Hewlett Packard, IBM, JVC, Lexmark, Panasonic, Philips, Sharp, Sony, and the Retailers Association of Massachusetts.

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<sup>222</sup> PRR, Test of Manufacturer Mail-Back Programs Report, January 3, 2003.

<sup>223</sup> EPA, <http://www.epa.gov/epaoswer/osw/conserve/plugin/pilots.htm>.

<sup>224</sup> [www.eiae.org/whatsnew/news.cfm?ID=96](http://www.eiae.org/whatsnew/news.cfm?ID=96) (February 2004).

## **EIA Consumer Education Initiative Website**

The Consumer Education Initiative (CEI) is a program developed by the Environmental Issues Council of the Electronic Industries Alliance (EIA) to inform consumers about recycling and reuse opportunities for used electronics. The website [www.eiae.org](http://www.eiae.org) has links to over 2,000 recycling opportunities nationwide that consumer can access by clicking on a map of the United States. It also has links to over 40 nationwide company specific initiatives.

## **WasteWise**

EPA's WasteWise, is a voluntary program that partners with over 1,100 businesses, governments, and organizations to help partners, among other things, divert outdated computers bound for the landfill. WasteWise provides participants with free technical assistance to get their waste reduction programs underway.<sup>225</sup>

## **eBay's Rethink Initiative**

Launched in January, 2005, Rethink is a collaboration between Ebay and it's primary ally Intel Corporation as well as a tool to coordinate efforts by industry leaders Apple, Gateway, HP, IBM and Ingram Micro with the U.S. Environmental Protection Agency, the non-profit Silicon Valley Toxics Coalition, UPS and the U.S. Postal Service, among other participants. The centerpiece of the program is a Web site ([www.ebay.com/rethink](http://www.ebay.com/rethink)) that helps consumers and businesses learn about the different product disposition alternatives, such as recycling and refurbishing, and makes it easy to put this knowledge into action by linking consumers to various reuse and recycling sources. This includes comprehensive information on the options available to consumers and small businesses to reuse or responsibly recycle computers, as well as easy access to a full range of responsible product disposition options - including services provided by Rethink Initiative participants -- and a variety of eBay-related solutions including assisted selling on eBay with convenient local drop-off options, trade-in programs, charitable donation options, or recycling programs in their local area.

## **The Recycling Electronics and Asset Disposition (READ)**

The EPA's Office of Environmental Information's READ (The Recycling Electronic and Asset Disposition) contract is to provide the government sector with a procurement tool to properly manage electronic inventories and to recycle and properly dispose of excess or obsolete electronic personal property in an environmentally responsible manner.

The objective of the READ contract is to offer clients a variety of methods for the proper disposal of electronic assets, including: refurbishment and redeployment within the requiring agency; reconfiguration and re-marketing of electronic material for either donation to federal programs, or resale within other markets; reclamation of the assets by de-manufacturing; tracking and reporting on the final destination of major electronic items; and recycling

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<sup>225</sup> See <http://www.epa.gov/epr/products/efed.html>.

electronic components that have been removed by the de-manufacture process. According to the EPA, the most important aspect of the services provided is contractor assurance that sensitive information stored in the electronics is properly sanitized and that an audit trail is created to track and report on the equipment's final destination.

One of the goals of the award contracts for recycling and refurbishing electronics equipment is to set the national standard for properly recycling and disposing of aging electronic equipment. READ is attempting to establish a process that will continually inventory excess equipment to determine which electronic items can be refurbished and used in other parts of the agency, which items can be donated to other agencies, and which items need to be recycled through the de-manufacture and reclamation process.

In summary, READ performs these services:

- Recycling obsolete equipment
- Logistical assistance for equipment pick up or equipment redeployment
- Reclamation of reusable electronic items
- Data security – safe disposal of sensitive or classified information
- Reporting functions – real time online audit trail of electronic component's final destination
- Revenue sharing for refurbished items that are resold.<sup>226</sup>

### **Electronic Product Environmental Assessment Tool (EPEAT)**

EPEAT is a multi-stakeholder process to design and implement a tool for evaluating the environmental performance of certain electronic products throughout their life cycle. The process was initiated to meet the growing demand by large institutional purchasers to buy greener products. EPEAT provides a clear and consistent set of performance criteria for the design of products, and provides an opportunity for manufacturers to secure market recognition for efforts to reduce the environmental impact of its products. It is expected to gain wide acceptance in IT (information technology) purchasing by federal and state government. The EPEAT tool is the product of a consensus process by a team of expert stakeholders (manufacturers, recyclers, purchasers, NGO's and Governments). In April 2006, the EPEAT criteria were finalized into the IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products.<sup>227</sup>

The basic characteristics of the EPEAT tool as developed to date are:

Scope of Products: The EPEAT rating system initially will address computers – desktops and laptops – and monitors. This scope may be expanded in the future.

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<sup>226</sup> See [http://www.epa.gov/oamhpod1/admin\\_placement/0300115/fedbiz.html](http://www.epa.gov/oamhpod1/admin_placement/0300115/fedbiz.html).

<sup>227</sup> See [www.epeat.net](http://www.epeat.net).



**Environmental Rating System:** The rating system will evaluate products and grade three levels of performance – Bronze, Silver and Gold. Rating within the levels will be achieved by meeting a combination of baseline mandatory criteria and obtaining additional points by meeting specific additional criteria that rate environmental attributes of the products.

**Environmental Criteria:** The EPEAT rating system has eight categories of product performance:

1. Environmentally Sensitive Materials
2. Materials Selection
3. Design for End of Life
4. Life Cycle Extension
5. Energy Conservation
6. End of Life Management
7. Corporate Performance
8. Packaging

Among these categories there are 23 mandatory criteria to qualify for base-level EPEAT certification, and 28 optional points to earn higher levels. To qualify for acceptance as an EPEAT product, it must conform to all the required criteria. Manufacturers may pick and choose among the optional criteria to boost their EPEAT baseline “score” to achieve a higher-ranking level. For example, a bronze score meets all the mandatory criteria, while a gold score meets all mandatory plus 21 optional criteria. Specific criteria are drawn heavily from existing US and international criteria such as Energy Star, RoHS, IT-Eco Declaration, and ECMA. The criteria will be reviewed and updated periodically by the IEEE 1680 Workgroup.

EPA had provided seed funding to the Green Electronics Council to maintain a registry of products meeting IEEE 1680, manage verification of vendor claims, and market EPEAT to purchasers nationally. A list of EPEAT registered products is expected to be available in the Summer of 2006. To date, EPEAT has been integrated into IT contracts totaling over \$21 billion dollars.<sup>228</sup>

### **The Federal Electronics Challenge (FEC)**

The FEC is a voluntary partnership program whose goal is to encourage federal agencies and facilities to purchase greener electronic products, reduce impacts of electronic products during use, and manage obsolete electronics in an environmentally safe way. Since the Federal Government purchases more than \$63 billion worth of information technology products and services annually, it seeks to provide leadership in environmentally sound and cost effective life-cycle management of electronic assets. The Executive Office of the President, and Departments of Agriculture, Defense, Energy, Health and Human Services, Homeland Security, Interior, Justice, Labor, Transportation, Veterans Affairs, Environmental

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<sup>228</sup> EPA.



Protection Agency, and General Services Administration have signed a Memorandum of Understanding (MOU) to develop and promote common strategies for using environmentally sustainable technologies and practices to improve the quality, performance, and environmental management of Federal electronic assets throughout their life cycle. They will achieve these goals through their participation in a national workgroup and through the Federal Electronics Challenge Program.

The combined purchasing power of the MOU signatory agencies and departments represents approximately \$54 billion, or 86 percent of the total annual IT budget for the Federal government. Through the use of their purchasing power, the federal government is working to shift the marketplace towards more environmentally sound electronic products and services.

### **The Green Suppliers Network**

The Green Suppliers Network (GSN) is a collaborative venture between industry, the EPA, and the “360vu,” which is the national account brand of the National Institute for Standards in Technology’s (NIST) Manufacturing Extension Partnership (MEP).<sup>229</sup> In the Green Suppliers Network, these organizations work with all levels of the manufacturing supply chain to achieve environmental and economic benefits.

In order to improve performance, minimize waste generation and remove institutional roadblocks, the GSN includes a number of key features. 1) GSN uses local 360vu MEP centers to perform one-on-one technical reviews at the supplier’s manufacturing facility. 2) the GSN review team will focus on incorporating energy and materials efficiency and process optimization into the supply chain, with the final goal of producing a process and value stream maps of a selected process. 3) GSN partners with leading companies to outreach throughout all tiers of the supply chain. 4) GSN uses metrics to quantify through 360vu centers economic and environmental benefits. 5) GSN encourages suppliers to identify regulatory obstacles, and provides a forum for identifying options for change. The goal is to help suppliers continuously improve their products and processes, increase energy efficiency, identify cost saving opportunities, and optimize resources and technologies and eliminate waste.<sup>230</sup>

### **Design for the Environment (DfE) Program**

EPA is undertaking, in cooperation with the electronics industry, the DfE Computer Display project to evaluate the environmental impacts, performance and cost of cathode ray tubes (CRTs) and active-matrix liquid crystal display (LCD) technologies used for desktop computer monitors. The approach combines environmental life-cycle assessment and risk assessment techniques and is intended to provide the electronics industry with information on

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<sup>229</sup> MEP is a non-regulatory Federal agency within the US Commerce Department’s Technology Administration whose mission is to develop and promote measurement, standards, and technology to enhance productivity and facilitate trade.

<sup>230</sup> EPA, <http://www.epa.gov/greensuppliers/program.htm>.

environmentally preferable technologies, materials, and processes and on environmental challenges that could be addressed in the future. The DfE program is also working with the printed wiring board industry and others to look for ways to reduce water, energy and toxic chemicals use in the manufacture of printed wiring boards.<sup>231</sup>

## **The U.S. Department of Defense**

The U.S. Department of Defense, awarded a contract in 1998 for electronic equipment demanufacturing. The contract is designed to assure compliant disposal of all hazardous components contained in electronic equipment and to maximize the return to DOD on the resulting valuable metals and other recyclable materials.<sup>232</sup>

## **The U.S. Department of Energy**

The U.S. Department of Energy has established a partnership for e-recycling with several recycling centers. Through them DOE funded grants to research better methods for recycling glass and plastics and established an e-recycling pilot project seeking to avoid costly disposal and refurbish the electronics for reuse of basic components. Over 1,190 metric tons of materials have been recycled by this program resulting in cost avoidance to the DOE of \$1.3 million to date.<sup>233</sup>

## **EPA Guidelines for Materials Management**

*(Developed for Plug-In to eCycling Pilots, EPA, May 2004, EPA530-K-004, [www.epa.gov/osw](http://www.epa.gov/osw))*

### *Purpose*

As part of an effort by EPA to develop national guidance for the management of “end-of-life” electronics, the Agency has drafted the following guidelines for use in the Plug-In To eCycling Campaign. The Campaign and its pilots will be used by the Agency to “test” these guidelines and allow the Agency to have real world information about what practices will most effectively protect human health and the environment, while at the same time enabling practicable programs for management of end-of-life electronics.

These guidelines are intended to be used as a framework for considering the acceptance of partners to the Plug-In Campaign. The Agency developed these guidelines based on what we believe, on a general basis, to be the most important elements for protection of human health and the environment in managing end-of-life electronics. However, the Agency is open to the possibility that not all aspects of these guidelines are critical in all cases of end-of-life management. That is, the Agency recognizes that, on a facility-specific basis, there may be practices that do not conform with every element of these guidelines, yet these practices may also ensure the protection of human health and the environment.

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<sup>231</sup> EPA, <http://www.epa.gov/opptintr/dfe/projects/computer/index.htm>.

<sup>232</sup> EPA, <http://www.epa.gov/epr/products/efed.html>.

<sup>233</sup> EPA, <http://www.epa.gov/epr/products/efed.html>.

Vital to the success of the Campaign, as well as any program for improved management of end-of-life electronics, is the availability of adequate markets for reuse and recycling. Thus, these guidelines are not intended to be a barrier to delivering reusable equipment or industrial feedstock materials to legitimate markets and environmentally sound facilities, wherever they exist.

### *Applicability of Guidelines*

These guidelines are applicable to all Plug-In partners who, through contracts or other arrangements, utilize reuse, refurbishment, recycling, or disposal services. Plug-In Partners take appropriate due diligence measures to ensure that downstream facilities and operations use practices that are consistent with these guidelines. The guidelines are applicable to all activities undertaken by a Plug-In partner, not just those that are undertaken as part of a Plug-In To eCycling pilot.

The guidelines are not written to directly address collection activities. Rather, the guidelines address activities that ensue following collection: reuse, refurbishment, recycling, and disposal, as well as the responsibilities of the Plug-In partner to ensure that such activities are conducted consistent with these guidelines.

Companies or other entities that perform recycling or related processing activities (other than collection) are not eligible to become Plug-In partners at this time. In order for the Agency to form Plug-In partnerships directly with processors and recyclers, the Agency would specifically request certain data and other information from these entities and/or request that such information be kept at the facility that would document the consistency of their operations with these guidelines. In order to minimize the burden on the public for information gathering pursuant to federal activities, the Paperwork Reduction Act of 1995 requires that the Agency obtain approval from the Office of Management and Budget (OMB) for such information gathering activities. Unfortunately, development of such an information gathering request by EPA, as well as the OMB approval process, would require 6 months to a year to complete. Thus, the Agency is not now in a position to request, receive, and review information from processors and recyclers regarding the consistency of their operations with these guidelines. As an alternative, it is the intent of the Agency to work towards the establishment of a third-party organization to function as an entity for review and recognition of processors and recyclers of end-of-life electronics. The Agency also will not accept as Plug-In partners entities that are primarily engaged in the landfill or incineration of end-of-life electronics, as these disposal operations are not the primary focus of the Plug-In To eCycling program.

### *Due Diligence*

The guidelines call for due diligence efforts on the part of Plug-In partners regarding the handling and disposition of end-of-life electronics. However, the guidelines do not incorporate the same level of due diligence under all circumstances. Rather, the level of due diligence recommended is commensurate with the risk of the activities involved, as well as being aimed at fulfillment of certain waste and material management goals under Plug-In. For example, the guidelines call for due diligence to provide assurance that incineration and landfill of any form of e-waste is minimized and, if utilized, is safe; whereas, the due

diligence steps for reuse, refurbishment, and recycling focus on only those used electronics that contain or consist of materials that, if mismanaged, are most likely to present hazards to human health or the environment. Thus, reuse is the most favored management option, followed by recycling and, least desirable, landfilling or incineration.

Guidelines 1-4 below pertain to all end-of-life electronics for which Plug-In partners have responsibility. Among other things, guidelines 1-4 call for due diligence regarding any electronic products or components that are sent to incineration or land disposal. However, guideline 5, regarding reuse and refurbishment, and guideline 6, regarding recycling, only pertain to certain “designated materials,” as defined in the relevant footnote. Designated materials are those that are of concern because they contain or consist of materials that, when mismanaged, may present hazards to human health or the environment.

Thus, no guidelines beyond those of 1-4 apply to the reuse, refurbishment or recycling of end-of-life electronics that, either in processed or unprocessed form, do not contain or consist of designated materials. The Agency encourages the processing (including sorting) of used electronics to enhance the value of output streams, often resulting in the generation of multiple commodity streams that do not contain or consist of designated materials.

Because equipment for reuse often contains designated materials, guideline 5 will be applicable to many reuse markets. However, to maximize reuse, the elements of guideline 5 are relatively simple--the Plug-In partner ensures that equipment meets legitimate reuse specifications, is packaged to protect its value, and that proper business records are kept of the transaction. The only other guideline having relevance to reuse is guideline 4(a)—the Plug-in partner ensures that export of reusable equipment is in conformance with the laws of importing and transit countries. Guidelines 1-5 are applicable to equipment for refurbishment.

## **GUIDELINES for MATERIALS MANAGEMENT**

### *All electronics*

1. The Plug-In partner<sup>234</sup> ensures that reuse, refurbishment, and recycling techniques are used to the full extent practicable, i.e., recognizing technical and economic feasibility, in an effort to minimize incineration and land disposal of electronic equipment and components. The Plug-In partner ensures that proper business records are kept demonstrating that incineration and land disposal are minimized.
2. Where incineration or land disposal is unavoidable, the Plug-In partner ensures that:
  - a. Consideration is first given to whether the waste has value for energy recovery. For certain wastes, such as plastics, incineration with energy

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<sup>234</sup> “Plug-In partner” means a manufacturer, retailer, government agency, non-profit, or other entity who (1) is not a recycler nor performs recycling activities (other than collection), (2) through contracts or other arrangements, utilizes reuse, refurbishment, recycling or disposal services, and (3) has a Plug-In To eCycling partnership agreement with EPA.

recovery is preferable over incineration without energy recovery or landfill. For wastes that have value for energy recovery, but for which energy recovery is technically or economically infeasible, the Plug-In partner ensures that a reasonable case of infeasibility has been made.

- b. The wastes (including those generated at refurbishment and recycling operations, smelters, etc.) are managed safely at facilities that are fully licensed for treatment and disposal purposes by all appropriate governing authorities. The Plug-In partner ensures that there is written evidence substantiating this.
    - c. Landfills and incinerators have an environmental management system in place, as is described in guideline 6(b) below for certain recycling facilities.
  3. The Plug-In partner ensures that all applicable federal and state requirements pertaining to the transport, processing, and management of electronic products and components are complied with.
  4. In the case of export of any electronic products and components, the Plug-In partner ensures that:
    - a. Any applicable requirements of the U.S., as well as applicable requirements of importing and transit countries, are complied with, and proper business records are kept documenting such compliance.
    - b. Prior to export, the materials listed below are removed and handled separately, unless:
      - i. The export is for purposes of reuse or refurbishment, or
      - ii. The Plug-In partner has documented and regularly monitored controls in place to assure that the materials will be removed in member countries of the OECD:
        - (1) Batteries.
        - (2) Mercury- and PCB-containing lamps and devices.
        - (3) Circuit boards, unless they are contained in hand-held electronic equipment, such as cellular phones, PDAs, etc. (Note: Under U.S. rules, minimal quantities of mercury and batteries that are protectively packaged to minimize dispersion of metal constituents do not need to be removed from whole circuit boards).
        - (4) CRTs and CRT glass, both of which are adequately processed for use as an industrial feedstock material prior to export.

*Note: The U.S. is not currently a party to the Basel Convention, although the U.S. is a member of the OECD. International trade in hazardous wastes is governed by existing agreements under both OECD and Basel, as well as by the laws of exporting, importing and transit countries. Trade in end-of-life electronics that are considered hazardous wastes intended for recovery between the U.S. and any OECD country are governed by the OECD control system, as implemented through the laws and regulations of the member countries. Because the U.S. is not a party to the Basel Convention, federal law does not yet include obligations for U.S. exporters of end-of-life electronics that are considered hazardous wastes*

*under the Basel Convention. However, U.S. exporters should be cognizant that Basel Convention requirements could affect them, as implemented by the laws of importing and transit countries. In addition, the importing and transit countries may have other laws and regulations that could affect U.S. exporters and their transactions. Until such time as the U.S. becomes a party to the Basel Convention, no country that is a party to Basel but not a member of OECD can legally accept hazardous waste exported from the U.S. absent a bilateral agreement between the governments under Article 11 of the Basel Convention. At this time, the U.S. has no bilateral agreements with any countries outside of the OECD that provide for the export of hazardous waste. Current U.S. rules regarding the export of hazardous wastes can be found at 40 CFR Part 262, Subparts E and H.*

*“Designated materials” for reuse or refurbishment*

5. This guideline applies to designated materials<sup>235</sup> that are directed to reuse or refurbishment.<sup>236</sup> However, it is only intended to apply to those shipments of designated materials (such as the following intact equipment: monitors, televisions, CRT bulbs, CPUs, laptops, printers and cell phones) that have been prescreened to meet legitimate reuse or refurbishment specifications. Unscreened shipments for evaluation of reuse/refurbishment potential and shipments containing some reusable (or refurbishable) and some non-reusable (or non-refurbishable) equipment are considered shipments for recycling and are addressed in guideline 6. In the case of refurbishment, guidelines 1-4 and 6 apply to any components that are subsequently determined to be unusable. For designated materials that are directed to reuse or refurbishment, the Plug-In partner ensures that:
  - a. All items in the shipment meet legitimate reuse or refurbishment specifications.
  - b. All items in the shipment meet the specifications of the consignee.
  - c. All items in the shipment are packaged in a manner that is consistent with preservation of the used equipment for reuse or refurbishment. That is, the packaging protects the used equipment in storage and transport, such that the value of the used equipment for reuse or refurbishment is not diminished.

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<sup>235</sup> “Designated materials” means any electronic products and components containing or consisting of circuit boards, shredded circuit boards, CRTs, batteries, and mercury- and PCB-containing lamps and devices. However, this definition does not include circuit boards that have been processed to the point where they no longer are readily identifiable as circuit boards or shredded circuit boards (such as after burning/melting), as well as CRT glass that has been adequately processed for use as an industrial feedstock material. In these cases, the economic value of the material has been enhanced significantly through processing; thus, commodities of value have been created and concern for the subsequent environmental mismanagement of this material is greatly decreased.

<sup>236</sup> “Refurbishment” means the repair, reconditioning or upgrading of an end-of-life product or component for the purpose of equipment reuse. Refurbishment of end-of-life electronics includes replacement of components or parts that are part of a larger piece of electronic equipment, aesthetic improvements, such as polishing and removal of scratches, and upgrading of the equipment by installation of new operating systems, memory, or software.



- d. Proper business records are kept that document the transfer of the used equipment to the consignee for reuse or refurbishment purposes, including:
  - i. Name and address of consignee.
  - ii. Description of shipment content and conformance with consignee product specifications.
  - iii. Product specifications of consignee.
  - iv. If for-profit transaction, amount paid for the consigned material.

### *“Designated materials” for recycling*

- 6. The Plug-In partner ensures that all designated materials that are directed to recycling<sup>237</sup> are processed by facilities that meet the guidelines herein. The Plug-In partner ensures that proper business records are kept that demonstrate that all downstream processing and recycling operations, including smelters, that receive designated materials, use practices that are consistent with these guidelines. For any processing and recycling facilities that receive designated materials, the Plug-In partner ensures that:
  - a. Facilities are fully licensed by all appropriate governing authorities. The degree of licensing necessary will vary depending upon the particular jurisdiction, as well as the size and nature of the facility. In some cases, extensive environmental permitting may be required by the governmental authorities, whereas in other cases perhaps only a business license is needed.
  - b. Facilities have an environmental management system (EMS) in place. EPA recognizes that flexibility for small businesses is necessary and that, in some cases, a fully developed and certified EMS may be unnecessary. In lieu of a fully a facility has a written plan describing the facility’s risk management objectives for environmental performance and compliance and its plans for attaining these objectives based on a “plan-do-check-act” continual improvement model. Regular re-evaluation of environment, health and safety (EH&S) objectives and monitoring of progress toward achievement of these objectives is conducted and documented at all facilities. EPA also recognizes that a fully developed EMS may not yet be in place for many facilities. In any case, a written plan describing risk management objectives and plans for attainment based on a “plan-do-check-act” model is in place.
  - c. Facilities take sufficient measures to safeguard occupational and environmental health and safety. Such measures may be indicated by local, state, national and international regulations, agreements, principles and standards, as well as by industry standards and guidelines. Except as noted below, such measures for all facilities include:
    - i. EH&S training of personnel.

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<sup>237</sup> “Recycling” facilities include any non-disposal facilities that receive designated materials under conditions that do not conform with guideline 5 above for legitimate reuse or refurbishment.

- ii. An up-to-date, written hazardous materials identification and management plan that specifically addresses at least the following: lead, mercury, beryllium, cadmium, batteries, toner, phosphor compounds, PCBs, and brominated flame retardants and other halogenated materials, with particular focus on possible generation of by-product dioxins and furans.
  - iii. Where materials are shredded or heated, appropriate measures to protect workers, the general public and the environment from hazardous dusts and emissions. Such measures include adaptations in equipment design or operational practices, air flow controls, personal protective devices for workers, pollution control equipment or a combination of these measures.
  - iv. An up-to-date, written plan for reporting and responding to exceptional pollutant releases, including emergencies such as accidents, spills, fires, and explosions.
  - v. Liability insurance for pollutant releases, accidents and other emergencies.
  - vi. Completion of an EH&S audit, preferably by a recognized independent auditor, on an annual basis. However, for small businesses, greater flexibility may be needed, and an audit every three years may be appropriate.
- d. Facilities have a regularly-implemented and documented monitoring and recordkeeping program that tracks key process parameters, compliance with relevant safety procedures, effluents and emissions, and incoming, stored and outgoing materials and wastes.
  - e. Facilities have an adequate plan for closure. The need for closure plans and financial guarantees is determined by applicable laws and regulations, taking into consideration the level of risk. Closure plans should be updated periodically, and financial guarantees should ensure that the necessary measures are undertaken upon definite cessation of activities to prevent any environmental damage and return the site of operation to a satisfactory state, as required by the applicable laws and regulations developed and certified EMS (e.g., using ISO, EMAS or industry standards, such as those of the IAER),

## APPENDIX V

### STATE LEGISLATION AND ACTIVITIES

The states legislatures have been very active in proposing and considering legislation on electronics recycling and bans on certain materials over the last few years. Overall, there were approximately 47 substantive measures on electronics recycling introduced in state legislatures in 2003: 10 called for producer responsibility, 10 included consumer fees, nine offered government solutions, and two invoked shared responsibility. Of these measures, five included disposal bans and four established advisory committees. In 2004, approximately 14 measures were introduced, of which seven called for producer responsibility, three included user fees, three established advisory committees, one invoked shared responsibility, and several included disposal bans. Many bills focused on CRT and mercury disposal.<sup>238</sup> In 2005 there were a total of 30 electronic recycling bills proposed in 23 states, with two more at the federal level.<sup>239</sup>

There are currently five states that ban CRTs from landfills. Massachusetts was the first to ban residential electronic waste in landfills in 1999. California, Maine, Minnesota, and New Hampshire have also banned disposing of CRT's in landfills.

Four states—California, Maine, Maryland, and Washington—have passed statewide electronics recycling legislation. California's is based on an advanced recycling fee paid by the consumer at the point of sale. Maine's and Washington's are based on producer responsibility. Maryland's assesses a fee on computer manufacturers to fund county collection programs. The other states with CRT bans are expected to pass comprehensive legislation in the near future. The following is a description of legislation, enacted and proposed, in some of the states that are the most active in electronics recycling. This survey of existing and proposed legislation is not a comprehensive list; instead it highlights the diversity of requirements to which producers, retailers, and other are or may be subject. State legislation moves quickly and the status of legislation may have changed by the time of this report's publication.

#### Enacted Legislation and State Programs

##### *Arkansas: Act 970 (H.B. 2115)*

This act, covering only state agency electronic waste, was signed by the Governor on March 21, 2005. It states that starting January 2008, all covered substances are banned from being disposed of in landfills. Agencies must seek other ways to dispose of these products through donation or recycling. Covered items include: computer monitors, TVs, audio and stereo equipment, monitors, computers, VCRs, keyboards, printers, telephones, and fax machines.

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<sup>238</sup> Rifer, Wayne, E-Waste: The New Waste Crisis – Legislative and Regulatory Drivers, *Rifer Environmental*, July 21, 2004.

<sup>239</sup> E-scrap News, October 2005.

*California: Electronic Waste Recycling Act of 2003*

The California Electronic Waste Recycling Act (SB20), passed in September 2003, requires collection of an advanced recovery fee (ARF) at the point of sale to help offset the costs associated with electronics recycling. It was amended by SB50, which delayed implementation. The law took effect on January 1<sup>st</sup>, 2005 by which date retailers were supposed to begin collection of an ARF on sales of covered electronic devices and were prohibited from selling devices without the label of the manufacturer clearly displayed. The law and regulations can be viewed at California's State Government website.<sup>240</sup> Commodities subject to an ARF are video display devices such as televisions, computer monitors, and laptop computers that contain CRTs and liquid crystal display monitors. (Fees on LCD and plasma television screens were added July 1, 2005.) The fee ranges from \$6.00-\$10.00 depending on screen size:

- Six dollars (\$6) for each covered electronic device with a screen size of less than 15 inches measured diagonally;
- Eight dollars (\$8) for each covered electronic device with a screen size greater than or equal to 15 inches but less than 35 inches measured diagonally; and
- Ten dollars (\$10) for each covered electronic device with a screen size greater than or equal to 35 inches measured diagonally.

California retailers are allowed to deduct a three percent administration fee on a quarterly basis from those funds collected from consumers. The fees also apply to mail order and Internet purchases. Many manufacturers and retailers doubted whether the state would be able to collect an ARF on Internet sales, not to mention discourage fraud in the system.<sup>241</sup> CIWMB, however, believes the majority of Internet sales are capturing the ARF. It can be noted that the largest sellers have a nexus in California.

The law requires the California Integrated Waste Management Board (CIWMB) and the Department of Toxic Substances Control (DTSC), along with other stakeholders, to implement the various aspects of the law. The ARF payment system is administered by the Electronic Waste Recycling Fee Section of the California Board of Equalization (BOE). Retailers remit the fees to the BOE, minus their three percent.

Entities that wish to become collection or recycling entities may fill out an application describing their capabilities to become an approved collector and/or recycler within the ARF payment system. The recycler receives 48 cents per pound from the state of which 20 cents is reserved for the collector.

California collected 64 million pounds of covered waste and \$73 million of ARF revenue in 2005. The State was prepared to extend a \$30 million loan from other programs to the CIWMB to jump-start the electronics recycling program. The loan, however, was not necessary; collection of the ARF began in January 2005 with retailers' remittances reaching the BOE in April in time for CIWMB to pay claims of collectors and recyclers, which were

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<sup>240</sup> California Integrated Waste Management Board, <http://www.ciwmb.ca.gov/Electronics/Act2003> and <http://www.ciwmb.ca.gov/Electronics/RegIssues> (February 8, 2005).

<sup>241</sup> Michele Raymond, Status of U.S. Electronics Waste Legislation, *Raymond Communications*, May 12, 2004.

filed starting in mid-March. BOE hired 55 additional staff at an estimated annual cost of over \$5 million for revenue collection management. CIWMB estimates total overhead by the state at approximately 18 percent presently, which includes a five percent reserve and one percent for advertisements. On top of that is the three percent kept by the retailers.

Recyclers receive \$0.48 per pound from the state of which \$0.20 is reserved for the collector. After the first year, collectors that handle over 100,000 pounds annually have reported costs of around \$0.19/lb. Most of the waste, 51 million out of the 64 million pounds, is collected by large scale recyclers handling over one million pounds annually. These recyclers reported costs of approximately \$0.27/lb. The average monitor is about 33-35 pounds, so the average per unit cost to recyclers/collectors is \$16.00. The average ARF, however, is \$8.00.<sup>242</sup> Recyclers must disassemble the electronic products in California, but there is no requirement on where the recyclers can then ship the parts.

In December 2005, revisions to the regulations were made to adjust for problems encountered, such as those electronics illegally dumped or left at collection centers without proof they originated in California. According to CIWMB, these account for approximately 10 percent of products, with Goodwill reporting an even higher percentage. December 31, 2007, is the target date by which the State hopes to eliminate electronic waste stockpiles and legacy devices.

There is no manufacturer responsibility in the California legislation to pay for transportation and recycling, but there are substantial reporting requirements. Manufacturers are required to affix labels to their products that clearly identify the manufacturer; submit reports to CIWMB detailing the number of covered devices sold in the state and on the amount of hazardous and recycled materials in their products; on any DfE efforts they have undertaken or are planning in the future; and make electronic waste management information available to consumers.

California's law copies the EU's RoHS Directive in banning certain materials from electronics. It uses the same deadlines as RoHS as well. As of January 1, 2007, DTSC regulations forbidding sale of devices containing materials prohibited by EU Directive 2002/95/EC may become effective. As has been previously noted, many of the major electronics manufacturers are already redesigning products for the European market to meet the RoHS requirements. Some of the leading manufacturers of electronics products believe that the legislation in California will help to speed up compliance to EU material restrictions from those companies who have been slow to make the necessary changes. It will also impact smaller manufacturers who might have planned to sell separate EU and U.S. products containing the restricted materials or who do not sell into the EU market.<sup>243</sup>

### *Illinois: HB 1149*

This law, passed both the state house and senate and signed by the Governor in 2005, establishes the Computer Equipment Disposal and Recycling Commission. The commission will investigate problems related to disposal and recycling of computer equipment, advise state agencies as to legislative actions, and make recommendations on pilot programs, and

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<sup>242</sup> Interview with Matt McCarron, California Integrated Waste Management Board, June 15, 2006.

<sup>243</sup> Inform, *Impact of the RoHS Directive on Electronic Products Sold in the United States*, September 2003, p. 4.

report to the Governor, General Assembly and the Director of the EPA on or before May 31, 2006.

*Louisiana: S.C.R.6*

This bill, signed by the Governor in June 2005, commissions a study into effective means for recycling e-waste and how these activities should be funded, to be presented before the beginning of the 2006 legislature.

*Maine: LD 743 and LD 1892*

In May 2003, the Maine Legislature passed “An Act to Protect Public Health and the Environment Through the Collection and Recycling of Electronic Waste” (LD 743), which required each producer of electronic equipment sold in Maine to submit to the Department of Environmental Protection (DEP) for approval a plan for producer-financed collection, recovery and recycling of electronic waste. The law bans landfilling and incineration of computer monitors, televisions, and CPU’s effective July 2006, as well as directs DEP to develop a plan for the collection and disposal of these products.

LD 1892, known as the “Act to Protect Public Health and the Environment by Providing for a System of Shared Responsibility for the Safe Collection and Recycling of Electronic Waste” was signed April 22, 2004. Manufacturers and retailers will be prohibited from selling covered devices produced by manufacturers who are not in compliance after January 2006. By January 2005, the manufacturer of a covered device that is for sale in Maine is required to have a visible permanently affixed label that clearly identifies the manufacturer. This Act is based on producer responsibility, but puts significant requirements on retailers as well. The law and regulations can be viewed on Maine’s State Planning Office website.<sup>244</sup>

Municipalities must provide for delivery of household televisions and computer monitors to consolidation facilities and are to locally, individually, or regionally determine how to accomplish this task. Options include on-going or one-day collections, curbside collections, or contracting with consolidation facilities for homeowners to deliver their own computer monitors and televisions directly to the consolidator.

Consolidation facilities must provide the state with an accounting of products by March 1 of each year and can either do the count internally or contract with a recycler to do the count. The invoices are billed to the manufacturers for handling, transportation to recycling, and recycling costs for their own units plus a pro rated share of orphans. Consolidators are required to ship to recyclers that meet environmentally sound management guidelines published by the Maine Department of Environmental Protection (DEP) while recyclers and dismantlers are to provide consolidators with proof that they meet ESM guidelines.

Effective January 2006, computer monitor and television manufacturers are individually responsible for paying consolidators the cost of handling, transportation from consolidation, and recycling of their own products generated as waste by households plus a pro rated share of orphan waste. Maine DEP must provide manufacturers and consolidators with a listing of each manufacturer’s pro rated share of computer monitors and televisions. Manufacturers are

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<sup>244</sup> <http://www.state.me.us/spo/recycle/hhw/electronics/index.php> (15 February 2005).



to submit a compliance plan to Maine DEP by March 1, 2005, and are to annually report on collection and recycling of their own products starting January 1, 2007.

Maine DEP must report on recycling of e-waste to the Legislature bi-annually from 2008 to 2014. All vendors of electronic devices to the State must provide take-back and management services at end-of-life for those products. State purchasing preference will be given to electronic devices that incorporate design for the environment.

Maine's law, unlike California's Electronic Recycling Act of 2003, assigns significant responsibility to manufacturers of electronics products, in that television and computer monitor manufacturers are required to develop and submit plans for compliance as well as to finance transport and recycling of their own products. Some manufacturers opposed this bill, while others such as Hewlett-Packard Company, strongly supported the bill.<sup>245</sup>

In regards to labeling and reporting requirements, there are similarities between the two states. For example, electronics products sold in both California and Maine are required to affix a permanent label that clearly identifies the manufacturer. The date for this labeling requirement to go into effect in both states is January 1, 2005. Some reporting requirements are similar in California and Maine: manufacturers will be required to report such issues as the number of electronic products sold in the states during the previous year and the amount of hazardous materials and recycled materials. But because of the responsibility Maine imposes on manufacturers, manufacturers of televisions and computer monitors who sell there are also required to develop and submit a plan for the collection, recycling, and/or reuse of televisions and computer monitors and report on the collection and recycling services used to recover their product. Additional costs to manufacturers would include accurately labeling all products with the name of manufacturer and tracking, on a state rather than regional basis, products sold and the materials used in those products.

### *Maryland: HB 575*

HB 575 went into effect July 1, 2005, and requires manufacturers of desktop personal computers, laptops, and computer monitors to offer a take back program to consumers free of charge or pay an increased fee. The bill establishes the Statewide Computer Recycling Pilot Program for a period of five and a half years to be administered by the Maryland Department of the Environment Office of Recycling. On January 1<sup>st</sup>, 2006, all manufacturers producing on average more than 1,000 computers per year over the last three years will have to pay an initial registration fee of \$5000. It will be unlawful to sell a computer in Maryland if not registered with the state. Manufacturers will pay a reduced registration fee of \$500 annually if they comply with the conditions set forth in the bill: establishing a computer take-back program to recover their systems at no cost to the consumer and properly labeling their computers with their name. If they fail to comply, they will continue to pay the annual fee of \$5000. According to the legislation, the registration fees are to be deposited in a State Recycling Trust Fund which will be used to administer the program, fund the counties

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<sup>245</sup> National Resources Council of Maine, *Legislature Establishes Recycling for Old Computers and TV's*, April 20, 2004, [http://www.maineenvironment.org/toxics/ewaste\\_bill\\_passes.htm](http://www.maineenvironment.org/toxics/ewaste_bill_passes.htm), (November 11, 2004).

collection and recycling plans, and deposit some portion in the General Fund.<sup>246</sup> The law further instructs the Department of Environmental Protection to study the effectiveness of the program and the public health impacts of disposing of and recycling cathode ray tubes by Dec. 1, 2008.

*Massachusetts: H1533*

In 1998, Massachusetts launched a multi-part strategy to develop an electronics-recycling infrastructure with a particular focus on CRTs. Accomplishments to date include:

1. In 1999, the Massachusetts Department of Environmental Protection (MA DEP) banned the disposal of CRTs—from individuals or companies—at municipal solid waste disposal facilities, effective April 1, 2000. Massachusetts was the first state to ban the disposal of CRTs by individuals.
2. MA DEP helped establish over 70 municipal CRT collection programs through its Recycling Grants Program. For municipalities, the cost of CRT recycling fell by 60 percent from 1999 to 2001. MA DEP also developed a guidance document for municipalities on recycling CRTs and other electronics.
3. MA DEP established six permanent regional collection centers across the state.
4. MA DEP initiated a research and development plan to promote markets for residential CRTs. The agency is also working to establish a "guaranteed market" for collected electronics through a single-payer state electronics-recycling contract.<sup>247</sup>

*Minnesota: SF 838 and H.F. 882*

Minnesota has a statewide ban on the disposal of computer monitors and televisions in mixed municipal solid waste, effective July 1, 2005 (SF 905 Section 129). Legislation for a statewide recycling program was introduced in the 2005 legislative session (H.F. 882). Only subdivision 2 of this bill, banning the disposal of any item with a CRT in a landfill, was signed by the Governor.

Other activities in Minnesota to boost electronics recycling include Hennepin County teaming up with the City of Minneapolis in 1998 to start a curbside collection program for electronic equipment containing CRTs. The addition of Minneapolis to Hennepin County's pre-existing program increased the collection of old electronics and more than doubled the collection of CRTs.<sup>248</sup> This recycling program in Hennepin County collected 1,500 tons in 2003, 98,118 units (44,432 CRTs), or 2.62 pounds per capita, for a total cost of \$1.4 million. The cost of recycling was \$0.48/lb, not including the cost of curbside pickup; \$0.33/lb or 67 percent went towards processing; 25 percent for recycling and disposal; 7 percent for

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<sup>246</sup> Unofficial copy of House bill 575 <http://mlis.state.md.us/2005rs/bills/hb/hb0575t.pdf> linked to Maryland State E-cycling in Maryland website <http://www.mde.state.md.us/Programs/LandPrograms/Recycling/SpecialProjects/ecycling.asp> (February 8, 2006).

<sup>247</sup> EPA, Product Stewardship: Electronics – State/Local Initiatives website.

<sup>248</sup> EPA, Product Stewardship: Electronics – State/Local Initiatives website.

hauling; and 1 percent for other. Dismantling was done by a non-profit job training facility in a labor-intensive process with laborers paid minimum wage.

### *New Hampshire: HB 1455*

In New Hampshire, May 26, 2006, the governor signed into law HB 1455 that bans video display devices from landfills and incinerators as of July 1, 2007. Video display devices defined as a "visual display component of a television or a computer, whether separate or integrated with a computer central processing unit/box, and includes a cathode ray tube, liquid crystal display, gas plasma, digital light processing, or other image projection technology, greater than 4 inches when measured diagonally, and its case, interior wires, and circuitry."<sup>249</sup>

### *Oregon: SB 867, HB 2971, HB 3563, SB 740*

In Oregon, SB 867 was signed by the Governor on August 22, 2003. It encourages Oregon to continue dialogue through the National Electronics Products Stewardship Initiative (NEPSI) and to develop a national system for managing end-of-life electronics, but it enables the state to move ahead on its own if a national solution is not forthcoming.<sup>250</sup> This legislation also calls for the creation of an Advisory Committee on Electronic Product Stewardship to evaluate market-based solutions to the problem of electronic products disposal. In addition to creating an advisory committee, it also calls for a pilot program to recycle and reuse electronics products. The unique aspect of this legislation is that it approached the problem of e-waste through economic development and also set up a collaborative process to manage e-waste, which involves producers, retailers, and consumers.<sup>251</sup>

### *Rhode Island: H7527*

In February 2001, Rhode Island became the first state to establish a permanent, statewide recycling collection facility for computers, owing to the success of a pilot program in 2000 in which the Rhode Island Resource Recovery Corp. (RIRRC) collected 87 tons of computer equipment. During the pilot, RIRRC worked with Massachusetts-based CRT Recycling Inc., which took most items at no charge except for nonfunctioning monitors, which were charged \$0.15 per pound. Working computers are refurbished and distributed for reuse, while broken computer equipment is recycled. The program only accepts residential equipment.<sup>252</sup>

### *Washington: HB 2488 and 1942*

The Governor of the State of Washington signed on March 24<sup>th</sup> a comprehensive Electronic Product Recycling Law based on producer responsibility to be operational by January 1, 2009. The bill requires manufacturers of televisions, computer monitors, desktop and laptops computers to join the State's standard plan or gives companies that have more than five percent market share the option of creating an independent plan to manage their equivalent share of collected products. The program requires that manufacturers provide free electronics recycling to the consumer. It uses community drop-off centers run by retailers, nonprofits

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<sup>249</sup> New Hampshire Department of Environmental Services, <http://www.des.state.nh.us/swtas/>, (20 June 2006).

<sup>250</sup> Product Stewardship Institute, United States Electronics Legislation Summary, March 27, 2003, p.5.

<sup>251</sup> Product Stewardship Institute, United States Electronics Legislation Summary, March 27, 2003, p.5.

<sup>252</sup> EPA, Product Stewardship Electronics – State/Local Initiatives website.

and government agencies. The Washington State Department of Ecology estimates that between 2003 and 2010 over 4.5 million personal computer units, 3.5 million cathode ray tube monitors and 1.5 million flat panel monitors will become obsolete in Washington.<sup>253</sup>

### **Proposed Legislation**

*(Following are some examples of legislation introduced in state legislatures as of August 2005)*

*Connecticut: HB 5375, HB 6259, HB 6267, HB 6269*

There were four bills in committee in Connecticut in 2004 in relation to electronics recycling. HB 5375 would establish a recycling program for certain electronic devices, which would be funded by a \$10 fee collected on these products by retailers at the point-of-sale. These funds would be deposited into an electronic recycling account, which would reimburse municipalities, operating committees, or other authorities that fund collection and would be used to create grant programs for municipalities to create or enhance their own electronics recycling programs. This legislation is similar to HB 6259, except that HB 6259 refers only to 'municipalities' while HB 5375 would provide funds from the electronics recycling account to additional entities conducting recycling programs. The bill does not specify whether fees collected would be an ARF or EOL fees.

HB 6267 proposes the establishment of a recycling program for certain electronic devices and the imposition of a recycling fee to fund such a system. This bill is intended to reduce lead in the environment and to set up a collection system for these products where no system currently exists.

HB 6269 would establish a recycling program for electronic products containing CRTs, using an ARF. A \$10 fee imposed upon the sale of electronics products containing CRTs would finance this system, and these funds would be deposited into an electronics recycling trust account. These funds could then be allocated to local municipalities for recycling programs for such products and to the Connecticut Department of Environmental Protection to fund consumer education programs as well as local government assistance programs related to electronic products with CRTs.

*Florida: SB 674, SB 678*

In Florida, Senate Bills 674 and 678 were introduced in 2003 to establish and fund a management system to collect and recycle end-of-life electronics products. This legislation would institute an ARF of \$10 on electronics products at retailers and would be collected by the Florida Department of Revenue. These fees would then be placed into a trust fund and would be used to develop the infrastructure needed for collection and recycling services.<sup>254</sup> Both bills were withdrawn.

Florida is promoting recycling infrastructure development by providing time-limited funding. Since 1998, the Florida Legislature has authorized over \$2 million in grants for collection and recycling infrastructure development. These grants have provided seed money to 23

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<sup>253</sup> See <http://www.ecy.wa.gov/programs/swfa/eproductrecycle/>.

<sup>254</sup> Product Stewardship Institute, United States Electronics Legislation Summary, March 27, 2003, pp. 1-2.

Florida counties for the development of sustainable and on-going electronics collection and recycling programs at the county level. In addition, a private electronics recycler received a grant to provide a comprehensive recycling demonstration project, centered on a major urban county.<sup>255</sup>

### *Michigan: S.B. 218 and S.B. 495*

S.B. 218 was introduced in February 2005 to amend the Natural Resources & Environmental Protection Act. It commissions a study on effective means for recycling e-waste and places a ban on disposal, covering CRTs. It required a task force to make recommendations by December 1, 2005, with the ban on CRT disposal to begin on June 1, 2006.

S.B. 495 was introduced in May 2005 intended to also amend the Natural Resources & Environmental Protection Act. The bill would require that state-owned consumer electronics be recycled. The state would have to establish recycling procedures and ensure that disposals were conducted according to these procedures. It would mandate that the state conduct a study on the feasibility of a state-wide electronics recycling plan for consumer electronics, to be reported within one year of the effective date of the legislation. It would cover TVs and monitors, computers, computer peripherals, audio and stereo equipment, VCRs, DVD players, video cameras, telephones, cell phones, wireless devices, and video game consoles.

### *Minnesota: SF 838 and H.F. 882, S.F. 1595 and H.F. 1729.*

Legislation for a statewide recycling program was introduced in the 2005 legislative session (H.F. 882). H.F. 882 would have: required manufacturers to submit to the state a plan for the collection and recycling of their products; stipulated that the cost of recycling had to be internalized and not passed on to consumers; explicitly mentioned both click-and-mortar as well as brick-and-mortar operations; and made the legislation subject to federal pre-emption with expiration of the state legislation 30 days after the implementation of a national plan. Only subdivision 2 of this bill, banning the disposal of any item with a CRT in a landfill, was signed by the Governor.

Two other bills were introduced in 2005 related to electronics recycling: S.F. 1595 and H.F. 1729. Under these bills, each producer would be responsible for financing the management of electronic waste, which may include a unique ARF for each product which could be as much as the actual cost of collection and transportation of historic waste similar to the new purchased product. A producer's recycling plan must include details on how to reimburse local governments, nonprofit corporations, and retailers for the cost of collection and recycling of the producer's covered electronic products. This legislation would cover: Appliances that contain complex circuitry, circuit boards, and one or more hazardous elements, including but not limited to TVs (CRTs/flat panel devices), audio and stereo equipment, monitors, computers, VCRs, keyboards, printers, telephones, fax machines, educational devices, toys, games, and major household appliances. The legislation also contains a federal preemption clause.

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<sup>255</sup> EPA, Product Stewardship: Electronics – State/Local Initiatives website.

*New York: SO1287, SO1562, SO1563, SO0636 and AO3390*

*SO1287:*

The Electronic Equipment Recycling Act introduced in January 2005 directs research into which products should be recycled, how this would be accomplished most efficiently, and what would be an adequate funding mechanism. This bill covers mainly CRTs, though there is a mention of items that contain complex circuitry.

*SO1562:*

This act is to amend the tax law to establish a personal income credit for costs incurred for the purpose of recycling electronic equipment and was introduced in January 2005. The bill would cover: appliances that contain complex circuitry, circuit boards or signal processing, and one or more hazardous elements, including but not limited to TVs, audio and stereo equipment, monitors, computers, VCRs, keyboards, printers, telephones, fax machines, and microwaves.

*SO1563:*

This act, introduced in January 2005, would amend the environmental conservation law by directing the commissioner of the environmental conservation to promulgate and adopt standards and guidelines within one year for the recycling, reuse, and remanufacturing of electronic equipment. It would cover the same items as SO1562.

*SO0636 and AO3390:*

This act would amend the general business law the environmental conservation law requiring retailers to accept used wireless telephones for recycling or reuse. The bills were introduced in early 2005. Each phone would have to be recycled in accordance with the Environmental Conservation Law, but there was no mention of a monitoring or tracking system.

*New York City INT. 643:*

The Equipment Recycling and Reuse Act of 2005 was introduced in May 2005. It stipulates that manufacturers of covered items must submit a plan for collecting and recycling these items to the department of sanitation. This bill covers CPUs, CRTs, keyboards, mice, TVs, computer monitors, video display devices greater than 4", laptops, and portable digital music players.

*North Carolina H.B. 1765*

The Electronics Recycling Tax and Electronics Recycling Act of 2005, introduced in May 2005, would impose a tax of one percent to two percent on manufacturers that do not have their own recycling plan. A one percent privilege tax would be imposed on manufacturers who distribute their products within the state and have not submitted a recycling plan. An additional one percent excise tax would be imposed on manufacturers who distribute their electronic products outside the state, but store their products within the state, and have not submitted a recycling plan. Manufacturers would have to develop and submit a product management plan, including a method for recycling, as well as paying \$20,000 to the Department on Environmental Matters for administrative costs in running the program. Items covered in the Act are CPUs, computer monitors, laptops, TVs, and video display devices with screen size greater than nine inches.



### *Oregon: HB 2971, HB 3563, SB 740*

In Oregon, two bills with an ARF were introduced in Oregon in 2003 that related to electronics products. HB 2971 would have imposed a \$50 fee on every CRT product levied at the point of sale. This bill would also have prohibited CRTs and CRT products from disposal in the solid waste system. HB 3563 would have imposed a \$3 fee on every television, computer monitor, CPU, laptop, circuit board, and electronic wiring sold in Oregon. The fee would have been collected at the point of sale. These fees would have been deposited into an Electronic Products Account, which would be used by the Department of Environmental Quality to develop the electronic management infrastructure as well as consumer education programs.<sup>256</sup>

In February 2005, SB 740 was introduced which would have created the Oregon Electronic Product Stewardship Act. This act would have required a \$10 or less ARF to be attached to covered items, with retailers keeping three percent of the ARF to cover administrative costs. Manufacturers would have been responsible for setting up recycling plans, which would have been required to be approved by the Electronic Product Stewardship Account. Covered items were: CPUs, monitors, laptops, TVs with a display larger than nine inches, and printers.

### *Rhode Island: H7527*

H7527 proposed that the Mercury Reduction Oversight Commission submit no later than January 30, 2005, a recommended plan, including any legislation necessary to implement a plan for the collection and recycling of electronic waste that utilizes producer responsibility.<sup>257</sup> This system is intended to be convenient and to minimize costs to the taxpayers and to consumers of electronics products. As mentioned, it sets out a system where the producers of electronics products finance the costs for collecting, recycling, and disposing their products and that these costs be internalized before the point of purchase. The legislation also allows for manufacturers to act in partnership with each other and/or with state, municipal, and regional governments to provide collection and develop and implement a safe and cost-effective system for handling these products.

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<sup>256</sup> Product Stewardship Institute, United States Electronics Legislation Summary, March 27, 2003, p.5.

<sup>257</sup> For copy of bill see Rhode Island Office of the Secretary of State  
<http://www.rilin.state.ri.us/BillText/BillText04/HouseText04/H7527.htm>, (28 Feb 2005).

**Remarks by Benjamin H. Wu, Assistant Secretary for Technology Policy,  
U.S. Department of Commerce, to**

**The National Conference of State Legislatures 2005 Annual Meeting**

**NCSL Environment and Natural Resource Committee**

**August 17, 2005**

The growth of the American high-technology sector has been one of the great stories of the past few decades, and there's perhaps no better example of technology's transformative power than right here in Seattle. A healthy percentage of our nation's \$400 billion high-tech and electronics industry can be found in this region. So, it's not only very appropriate for us to be here to discuss e-waste, an issue of growing importance to the high-tech industry, but also for NCSL to be here as well, because the technology industry is increasingly facing policy issues that go beyond the federal level to the state level. From this morning's opening keynote from Microsoft's Bill Gates to the fact that a quarter of the 150 conference sessions are tech-related, technology is certainly a major focus of this year's NCSL activities. In part due to the leadership in state legislatures, the U.S. technology industry continues today to be a driver of economic growth and our quality of life by providing electronics products that can educate us, entertain us, enthrall us, connect us, and make us more productive.

These electronics products are now ubiquitous in our society. All one needs to do is attend the Consumer Electronics Show or go to your local Best Buy, Circuit City, or Radio Shack to understand that the rapid growth of electronics products is the wave of our future, and sustaining that innovative growth may very well determine our nation's ability to compete in the global marketplace. The proliferation of consumer electronics products is a modern-day reality.

As Americans begin to dispose of early generation electronics products that have reached the end of their life cycle, or choose to upgrade to newer models, the issue of waste disposal (or "e-waste") is an issue that lawmakers and policymakers are confronting.

It's an issue that is literally piling up in our landfills, which contain waste elements that may hold some recyclable value but also may contain elements, especially in the early generation products, that could make their disposal and presence in the landfills potentially hazardous.

Take, as an example, the computer that sits right now in your legislative office.

It probably contains at least trace amounts of lead, aluminum, iron, nickel, arsenic, cadmium, mercury, titanium, zinc, beryllium, and gold. Multiply that by the number of electronics products out in the marketplace and it begs some to question the potential environmental impact. According to the Consumer Electronics Association, Americans own some 2 billion electronics products – about 24 products per household. Over the next 20 years, the typical American household is expected to dispose of 68 different devices including: 10 computers, 20 cell phones, 7 televisions, and several VCR's, CD and/or DVD players, answering

machines, and printers, according to the Consumers Union. According to the U.S. Environmental Protection Agency, while e-waste is currently less than 1.5% of municipal solid waste, its growth rate is accumulating at three times the rate of other household trash and totals about 2.2 million tons. Those 2.2 million tons of electronics products discarded could fill over 200 jet airplanes which Boeing manufactures right here in Seattle just a few miles away. Computers are now so much more affordable that consumers are choosing to simply replace them quickly when they have a desire to enhance their high-performance Internet connectivity or a need to disinfect spyware on their systems.

Then there's the digital television transition, which, if as expected, could "pull the plug" on those not digital-ready TV's in 21 million households over the next four to five years – which has led some to ask: "What is going to happen to all those old TV sets then?"

Furthermore, it is thought that the majority of Americans are currently hoarding large portions of their electronic waste in their basements and attics, feeling that their old computer or television might still have some value while being uncertain of how to dispose of them. As further generations of technology evolve and consumers dispose of their currently hoarded goods, a tsunami of electronics waste may hit us in the coming years.

As a consequence, and in an attempt to create incentives to recycle electronics, state legislatures from Sacramento to Annapolis have taken action to address this problem.

Three states have already enacted laws – California, Maine, and Maryland – and in the first half of 2005 alone, 30 state and local legislatures saw more than 50 separate bills introduced on the issue, including an e-waste measure introduced and still active in New York City.

In the U.S. Congress, several pieces of legislation have already been introduced in the first session of the 109th Congress to try and tackle the issue on a national scale.

Additionally, the U.S. Environmental Protection Agency, the White House Council on Environmental Quality, and the Department of Commerce have been engaged on the issue of reuse, recycle, remanufacture, and e-waste.

You may ask, "Why is the Department of Commerce so engaged on an environmental issue?" Simply put, it all comes down to one word: "competitiveness." Our mission at the Department of Commerce is to enhance our nation's ability to compete in the 21st century global economy – to preserve our U.S. innovation base and to maintain our technological preeminence. How our e-waste solutions are developed and who is involved in the decision process can dramatically affect the U.S. technology industry's manufacturing and marketing business models, as well as their competitiveness. At the Department of Commerce's Technology Administration, as the portal for the U.S. high-technology industry, we have heard the concerns from industry regarding the need for an industry-led consensus that will give certainty to the U.S. high-technology sector. Towards that goal, over the past year, we have worked to: Complement EPA's already-existing activities; Advance the drive to a consensus; Meet with affected stakeholders;

Convene a roundtable; Issue a Federal Register notice for comment; and Will soon be issuing an overview of e-waste policy issues in order to educate and inform Congress on relevant issues to be considered, as they proceed with legislative consideration.

This overview, which is gleaned from lessons learned from our e-waste activities will provide background on the issue of electronics recycling, including an explanation of the different possible components of a recycling system. The overview will also be posted on our website [www.technology.gov](http://www.technology.gov) and, if you're interested, I would be happy to take your business card at the conclusion of my remarks so that we can notify you when the report comes out.

In the short time I have with you this afternoon, I would like to: (1) Briefly review the major issues affecting e-waste and summarize some of our findings from our soon-to-be released report; (2) Update you on activities on the federal level; and (3) Tee-up some of the important questions that will be raised here at Friday's panel session, featuring experts and stakeholders who will go into greater depth and detail over the intricacies of issues affecting the life-cycle of electronics technology products.

As you either know already, or will hear on Friday, there are numerous opinions, various perspectives, and any number of stumbling blocks involved with this issue. It was Senator John Thune from South Dakota, who chaired the Senate Environment and Public Works subcommittee review a few weeks ago, who said in his opening statement: "As I have discovered in preparation for this hearing, it seems that this issue is very similar to the layers of an onion – the more you learn, the more complex it becomes."

Electronics waste disposal and recycling is indeed a multi-faceted and intricate issue – one which has not been easily drawn to consensus. The debate is still on-going, despite several attempts at reaching unanimity encompassing several years. That's because the issue involves many stakeholders and the impacts of the decisions any level of government makes concerning electronics recycling holds ramifications that are far-ranging – not only having environmental impacts, but also extending to the health of U.S businesses and their ability to compete internationally.

It's important that we involve all of the stakeholders who may be affected by electronics recycling legislation so that we will be able to fully understand the implications of actions undertaken, and provide the opportunity for all affected parties to offer their input into shaping the most effective solution.

A growing concern is that as several states have begun consideration of different legislative proposals – and with California, Maine, and Maryland already passing three distinctly different approaches to manage electronics waste – it's conceivable that within the United States there could be as many as 50 different sets of laws or regulations which will significantly impact an important sector of the U.S. economy.

What would be the result of such disparate requirements? For starters: Significant burdens for a globally competitive industry to comply with potentially non-uniform mandates; the

need to reconfigure manufacturing requirements on a state-by-state basis; and radical disruptions of a tech company's current distribution models.

We have heard industry's deep concerns that leaving this issue to the states becomes problematic because of the cost of compliance with a mishmash of international and state laws. Companies and consumers will be confused, including those who want to do the right thing, and the best-laid plans may mean that not a whole lot of recycling would ultimately get done. Industry believes a national solution is required because conflicting state legislation would lead to uncertainties, inefficiencies, and high compliance costs that will impede their ability to be competitive and innovative. Industry is focusing on efforts to create a national system that will achieve the goal of increasing recycling while not hindering interstate commerce.

If Congress is to act and move towards a national solution, they will need to examine a range of possibilities, which may include the establishment of: A government sponsored recycling program; An Advance Recovery Fee (ARF), a fee paid by the consumer at the time of purchase that would offset the cost of the eventual recycling of the product which is the basis for the 2003 California law; A producer responsibility model, where each manufacturer would be responsible for its own products and a certain percentage of orphaned products (electronics waste produced by a company that is no longer in business or cannot be identified); A consumer mail-in program; A deposit refund system; and/or several combinations of the above possibilities.

Congress must also ensure that all stakeholders should be considered in any national plan.

These stakeholders should include, but are not limited to: Electronics manufacturers; Retailers – who are often overlooked; Recyclers; Environmental groups; and Last, but certainly not least, consumers.

Additionally, Congress may weigh several other issues that they could take into consideration when devising a strategy for electronics recycling. They include such issues as: Which products should be considered for a program, and how they should be gradually phased in; How discarded products should be collected and transported and by whom; How new products should be classified and sold on the Internet without leaving brick-and-mortar retailers at a competitive disadvantage due to mandated fees; How orphaned products should be addressed; and How consumers can be encouraged to actively participate in any established recycling program. From our Commerce activities, here are some consensus points if there is to be a national solution.

There are several areas in which many or most stakeholders have been able to reach agreement. Stakeholders want a system that is effective, efficient, enforceable, environmentally friendly, and adequately financed, with equal treatment and equal responsibilities for producers in the marketplace. Representatives of industry, retailers, recyclers, and environmental organizations that participated in our technology recycling roundtable all agreed on product stewardship as a goal. Also, the roundtable participants, those stakeholders who were engaged in the EPA-led National Electronics Product

Stewardship Initiative (NEPSI), and the majority of commentors responding to our Federal Register notice, all agreed that a national system of electronics recycling is preferable to a state-by-state system. If there is to be a national system of electronics recycling, the scope of consideration may include the following criteria:

Product Coverage:

- Define covered products clearly to eliminate guesswork and lengthy negotiations between producers and retailers

Collection:

- Set performance goals such as targets for percent or weight per capita for collection and recycling.
- Provide flexibility for local and regional solutions in collection methods, such as using collection incentive payments, not mandates or a centrally proscribed collection process.

Recycling:

- Change the treatment of e-waste under existing solid waste regulation so that electronics products can be reused and recycled properly without triggering “hazardous waste” regulations.
- Set environmentally sound management guidelines for recycling and provide a system of auditing to ensure that dismantlers and recyclers are evaluated against these guidelines.
- Control the export of hazardous electronics waste to developing countries either for disposal or for recycling to organizations and countries not in compliance with U.S. treatment of the same materials.
- Maintain the flexibility to find the best recycling solutions on an international level within the confines of environmentally sound management guidelines

Financing:

- Establish procedures to oversee and enforce the system to ensure fairness and uniform participation, regardless of the financing system chosen.
- Many stakeholders expressed concern that if the government managed funds that were collected to finance a recycling system, the government could use the funds for other purposes. Thus, many stakeholders recommended using a Third Party Organization (TPO), outside of the government, to manage the system and to build competition and market forces into the system from the beginning in order to keep costs low.



### Minimizing Compliance Costs and Maximizing Participation:

- Standardize product labeling requirements, product literature requirements, information on packaging requirements, and reporting requirements so producers face only one set of requirements for compliance across the country.
- If design standards or material bans are part of legislation, include industry in their development.
- Ensure a level playing field for all manufacturers so there are no free riders and no E-Commerce loopholes.
- Regardless of which system commentators preferred, many mentioned the need for Federal legislation to ensure that all competing producers within a product category are mandated to participate and meet the same high standards for collecting and recycling or reusing their electronics products.
- Mandate that manufacturers who sell over the Internet and foreign manufacturers are full participants in the recycling program, including any collection and remittance of fees and responsibilities.

### Incentives for a Market-driven Solution:

- Use the Federal Government's leverage as one of the country's largest IT buyers to drive design improvements, manufacturer participation in recycling solutions, and end-of-life services.
- Increase use of Federal Government programs that Federal agencies can voluntarily choose to join, such as the Federal Electronics Challenge (FEC) and the Recycling Electronics and Asset Disposition (READ) contract.
- Develop incentives in the private sector for DfR and DfE through programs that reward environmentally friendly design, such as EPEAT, Energy Star, DfE Program, and the Green Suppliers Network.
- Stimulate recycling and the market for recycled content and products using tax, procurement, or other incentives.
- Educate consumers about the importance of recycling and the opportunities for recycling.

So, what's the next step and what will Congress do? I can't speak for Congress and even having worked there for 13 years does not allow me to predict what this 109th Congress will do, but I can tell you that I have never seen before in the hallowed halls of the "other" Washington such a dynamic attempt to develop a course of action on e-waste and such a sincere spirit of bipartisanship to find a national solution. It's manifested itself in just the past few months by the introduction of several pieces of Congressional legislation.

The first set of Congressional e-waste hearings, initially in the House Energy and Commerce Committee chaired by Congressman Gillmor of Ohio on July 20, then followed a week later in the Senate Environment and Public Works Committee chaired by Senator Thune of South Dakota on July 26. Chairman Gillmor is also expected to follow-up with another hearing in September when Congress reconvenes; and the establishment of the bipartisan House E-

Waste Working Group to develop a national solution while educating Members of Congress about the issue; The Working Group is led by Congressman Cunningham of California, Congresswoman Bono of California, Congressman Thompson of California, and Congresswoman Slaughter of New York.

In speaking to the Senators, Congressmen, and their staffs about this issue, I can sense a real desire for moving forward, the need to address the issue, and no discernable pride of authorship in the development of a national solution. So, I believe all the ingredients are there for Congressional action –the momentum, the leadership, and the desire.

Are all these ingredients enough or does the recipes for a national solution require more? More from Congress? More from industry? More from the stakeholders? More from the states?

And what should you, as a state legislator, take away from all of this recent Congressional activity? Should states now defer to Congress and hold off on establishing yet another potentially disparate requirement for industry to follow?

What if despite all the sound and fury, there is ultimately no federal action, shouldn't states be encouraged to act? How long are states supposed to wait for a national solution before they address the issues within their own state?

What about the benefits of having states act? Doesn't state action spur the creation of a recycling infrastructure necessary for a national solution to work? Doesn't state and local action spur public education on the issues?

As you can see, there are many questions, with no easy answers. These questions will be raised and, hopefully, answered to some satisfaction at Friday's panel discussion. In preparation for Friday, however, they're worth thinking about now. While certain states have already enacted legislation, and many other states are moving in that direction, it seems clear that it will take several years for each state to determine the impact of their actions and legislation. It's therefore important for states to stay involved on the national level and share successes and challenges.

Federally, we're committed to assisting a common-sense, national approach to the e-waste challenge – one that provides certainty, consistency, and clarity for consumers, governments, and all stakeholders. Removing unnecessary burdens to the technology sector's ability to compete in today's global market remains critical for the industry and our nation. We will work together with you, Congress, the technology industry, manufacturers, retailers, recyclers, consumers, and all affected stakeholders to help fashion a balanced, equitable solution so that we can not only preserve our environment but also our nation's economic strength for our children.

Thank you. I would be happy to take your questions.

## APPENDIX VI

### RECYCLING MODELS FROM OTHER INDUSTRIES

#### **The Rechargeable Battery Recycling Corporation**

Beginning in 1989, when Connecticut passed a battery law, states have taken the initiative on legislation to recycle dry cell batteries. Minnesota in 1990 and New Jersey in 1992 passed what remains the most far-reaching battery legislation in the nation. Both states require that rechargeable batteries be easily removable from products, have labels that indicate proper disposal procedures, and be banned from the municipal waste stream. Also, they mandate that manufacturers take rechargeable batteries back at their own expense for proper disposal or recycling. Prior to the passage of the Minnesota and New Jersey laws, the technology needed for recycling batteries in the U.S. was available, but rarely used. These state's laws prompted the development of a battery recycling infrastructure.<sup>258</sup>

In 1991, in response to battery legislation being introduced around the country, the five largest rechargeable battery manufacturers in the country broke away from the trade associations that had traditionally represented them and formed the Portable Rechargeable Battery Association (PRBA). These manufacturers were: Panasonic, Sanyo, Saft, Varta, and Gates Energy Products. Through the PRBA, these companies lobbied at the state and Federal levels, addressed government policies, and committed themselves to the development of a take-back program for rechargeable batteries.

In 1994, the PRBA assisted in the formation of the Rechargeable Battery Recycling Cooperation (RBRC), an independent nonprofit public service organization, which began physically facilitating the collection of rechargeable batteries and licensing its seal to fund the program. The mission of the organization is “to perform a public service through the management, collection and recycling of used nickel-cadmium (Ni-Cd), Nickel Metal Hydride (Ni-MH), Lithium Ion (Li-ion) and Small Sealed Lead (Pb) throughout the United States.”<sup>259</sup> This goal involves educating the public on battery recycling, and collecting and recycling batteries for its licensees – manufacturers who fund their programs. The PRBA also supported Federal legislation on battery recycling.

#### *Federal Legislation*

On May 13, 1996, President Clinton signed into law the Mercury-Containing and Rechargeable Battery Management Act (The Battery Act). This Act proved to be a major step forward in the effort to facilitate the recycling of nickel-cadmium (Ni-Cd) and certain small sealed lead-acid (SSLA) rechargeable batteries and to phase out the use of mercury in batteries.

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<sup>258</sup> Inform, <http://www.informinc.org/recyclenicd.php>.

<sup>259</sup> Rechargeable Battery Recycling Corporation, [www.rbrc.com](http://www.rbrc.com).

The Battery Act was the culmination of a five-year effort by the battery industry which sought to remove regulatory barriers to the collection and recycling of batteries. Acknowledging the steady increase in the use of rechargeable batteries, potential environmental impacts resulting from their improper disposal, and growing state legislation, Congress passed the Battery Act to facilitate the increased collection and recycling of Ni-Cd and certain SSLA rechargeable batteries. The Act targets battery and rechargeable product manufacturers and battery waste handlers; it does not apply to consumers. Specifically, the Act:

- Establishes national, uniform labeling requirements for Ni-Cd and certain SSLA rechargeable batteries.
- Mandates that each Ni-Cd and certain SSLA rechargeable batteries be “easily removable” from consumer products. A battery can be easily removed if it is detachable or removable from the product with the use of common household tools.
- Makes the Universal Waste Rule effective immediately in all 50 states for the collection, storage, and transportation of batteries covered by the Battery Act. This eased the regulatory burden on battery handlers and transporters by streamlining a number of RCRA’s<sup>260</sup> hazardous waste collection and management requirements, including those related to notification, labeling/marketing, accumulation time limits, employee training, and offsite shipment, among others.
- Requires EPA to establish a public education program on battery recycling and the proper handling and disposal of used batteries. EPA is required to consult with manufacturers and retailers to carry out this initiative.
- Prohibits, or otherwise conditions, the sale of certain types of mercury-containing batteries (i.e., alkaline-manganese, zinc-carbon, button cell mercuric-oxide, and other mercuric-oxide batteries) in the United States.

The EPA may require compliance and/or assess a civil penalty of up to \$11,000 for each violation of the labeling, easy removability, and Title II requirements of the Act. Under an exemption to the Act’s enforcement provisions, EPA cannot take enforcement action against retailers for selling a battery or rechargeable product that does not meet the labeling or easy removability requirements of the Act. Thus, retailers do not have an incentive to ensure that the batteries they carry are in compliance with the Act and are not obligated to participate in or promote battery recycling programs. Despite this, RBRC reports that over 34 major national retailers participate in its program, representing over 30,000 retail collection sites. Additionally, the law would be difficult to enforce due to the manpower that would be required. While retailers are not liable for carrying batteries or rechargeable products that do not meet the Act’s labeling or easy removability requirements, importers are not exempt from

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<sup>260</sup> The Resource Conservation and Recovery Act (RCRA), governs the EPA’s authority to control hazardous waste.

liability, and a retailer can be held liable by EPA if it has knowledge that the chemical contents of a battery are in violation of Title II of the Act.<sup>261</sup>

Under the Battery Act, states can implement and enforce any requirement that is identical to (and hence not more or less stringent than) that in the Act with respect to the labeling and easy removability of rechargeable batteries, and the collection, storage, and transportation of covered batteries. However, states are allowed to adopt more stringent requirements for any other provision of the Battery Act, such as those concerning the prohibition on the sale of certain mercury-containing batteries. Finally, the Battery Act does not govern recycling and disposal of covered batteries. Hence, states can continue to adopt and enforce standards for the recycling and disposal of covered batteries that are more stringent than existing Federal standards under RCRA.

### *State Disposal Bans*

The following are states that now have Nickel Cadmium and Small Sealed Lead (Ni-Cd/Pb) disposal bans. All end users under their jurisdiction are prohibited from throwing those batteries in the trash and must send the batteries for recycling/proper disposal through manufacturer/distributor or other collection programs.<sup>262</sup>

- Florida
- Maine
- Minnesota
- Vermont
- Iowa
- Maryland
- New Jersey
- Rhode Island

The following are states with disposal bans covering all types of lead batteries (including but not specifying small sealed lead batteries). All end users are prohibited from throwing batteries in trash and must return them for recycling through retailers, distributors, or manufacturers or send directly to a secondary lead smelter.<sup>263</sup>

- Arizona
- Arkansas
- California
- Connecticut
- Florida
- Hawaii
- Indiana
- Iowa
- Kentucky
- Louisiana
- Maine
- New Hampshire
- New Mexico
- North Carolina
- North Dakota
- Oregon
- Pennsylvania
- South Carolina
- South Dakota
- Texas
- Utah
- Vermont

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<sup>261</sup> EPA, Implementation of the Mercury-Containing and Rechargeable Battery Management Act  
<http://www.epa.gov/epaoswer/hazwaste/recycle/battery.txt>.

<sup>262</sup> <http://www.rbrc.com/business/index.html>.

<sup>263</sup> Rechargeable Battery Recycling Corporation, [www.rbrc.com](http://www.rbrc.com).

### *RBRC Programs*

As a non-profit organization, the RBRC collection and recycling system is financially supported by license fees paid by battery manufacturers. Each Ni-Cd license fee is paid for individually and according to weight. The fee a manufacturer pays to put the RBRC seal on their product is \$0.015 for a single AA size NICKEL battery and \$0.25 for a 12 volt NiCd power tool battery. Ni-MH and Li-ion fees are based on voltage: \$0.01 for Ni-MH and Lithium ion batteries up to 8 volts, and \$0.02 for such batteries over 8 volts.<sup>264</sup>

RBRC is funded by the owner of the brand name on the battery pack as the licensee and the owner of the brand name on the consumer product as a sub-licensee. In order to deal with used batteries generated from many different origins, the RBRC has created three recycling plans--retail, community and public agencies, and business.

#### **National Retail Participants -USA**

- Alltel
- Batteries Plus
- Best Buy
- Black & Decker
- Cingular Wireless
- The Home Depot
- Lowe's
- Milwaukee Electric Tool
- Office Depot
- Porter Cable ServiceCtrs.
- RadioShack
- Remington Product Co.
- Sears/Orchard Supply
- Staples
- Target
- US Cellular
- Verizon Wireless
- Wal-Mart

#### **National Retail Participants -Canada**

- Battery Plus
- Bell Mobility
- Canadian Tire
- FIDO/Microcell
- Future Shop
- The Home Depot
- Home Hardware
- London Drugs
- Makita Factory Service Centers
- Personal Edge/Centre du Rasoir
- RadioShack Canada
- Revy
- Sears
- The Sony Store
- Telus Mobility
- Zellers

Retailers who are involved in the RBRC program participate free of charge. All transportation, handling, and recycling charges are paid by RBRC and funded by Seal fees. Retailers' responsibilities entail setting up drop-off points in their stores and mailing the batteries to consolidation points. Originally, retail collection only took place in states that implemented the Universal Waste Rule or passed other laws permitting retailers to not be classified as hazardous waste handlers. It was not until the passage of the Battery Act in 1996 that a nationwide retail collection program could begin.<sup>265</sup>

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<sup>264</sup> Rechargeable Battery Recycling Corporation.

<sup>265</sup> Inform, <http://www.informinc.org/recyclenicd.php>.



The RBRC community and public agency program allows communities to use their existing local waste infrastructures to collect batteries and then ship them to one of the RBRC's two consolidation areas. The program also provides an avenue for hospitals, police and fire departments to recycle the rechargeable batteries from their mission critical equipment. More than 2,370 communities and public agencies are currently enrolled. While the community is responsible for transporting the batteries to the RBRC, the RBRC pays all shipping costs. More than 2,370 communities and public agencies are currently enrolled.<sup>266</sup>

Businesses use increasingly large amounts of rechargeable batteries in their cellular phones, 2-way radios, PDAs, and laptop computers. In the business program, the company supervises its own collection program and pays to ship them to RBRC consolidation points. The RBRC pays for all additional costs and nearly 2,000 companies participate in the program

In the RBRC program, manufacturers who are licensees are allowed to collect their own batteries. Under the licensee collection programs, the RBRC pays for the recycling charges and container disposal fees, but the manufacturer pays for shipping used batteries in its own containers to the recycler. In order to avoid paying recycling fees twice by recycling its own batteries, if a manufacturer recycles its own Ni-Cd batteries through the RBRC program it is eligible for a rebate of 75% of its RBRC fees.

After the 1996 Battery Act was passed, the RBRC began a nationwide campaign to educate the man on the street about battery recycling. The RBRC has used TV and radio, through a satellite media tour, print communication, news stories, its website, trade shows, airport banners, sponsoring a national Battery Check Day, and hiring Richard Karn ("Al" from the television show Home Improvement) as its spokesman, to inform the public about the environmental benefits of recycling batteries and how citizens can recycle. The RBRC considers educating the public to be one of the most critical factors in determining whether batteries get recycled or end up in a landfill. In 2004, the RBRC spent \$4.5 million on its education campaign and plans to spend \$6 million in 2005.

As it stands, the RBRC has collected more than 25 million pounds of rechargeable batteries since 1996. Every year since 1997, the total number of batteries diverted from the nations' solid waste stream has steadily increased, from 1.9 million pounds collected in 1997 to over 4 million pounds collected in 2003. Based on a survey completed in the late 1990's, the RBRC found that the number of batteries recycled each year equals roughly 25-30% of the number of batteries sold in a given year.<sup>267</sup>

However, RBRC representatives state that it is difficult to estimate the rate of return due to the amount of rechargeable batteries they believe people neither recycle or throw away when the product is no longer being used and instead, keep them in their household as a possible back up, a process that is referred to as "hoarding." A 2003 hoarding survey found that on average, U.S. consumers keep the following products and the batteries that power them: cell phones: 5.1 years; cordless power tools: 9.6 years, personal care: 6.2 years. Additionally, the

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<sup>266</sup> Inform, <http://www.informinc.org/recyclenicd.php>.

<sup>267</sup> Interview with David Thompson, Panasonic, December 26, 2004.

survey found that 66% of the people who own these items intend to eventually dispose of them.

### *Challenges*

Prior to passage of the Federal Battery Act in 1996, RBRC found that conflicting state regulations were a barrier to its goal of creating an effective battery recycling system. Differences among state systems deterred manufacturers from making the costly effort to comply with multiple state battery-labeling and waste management regulations. The Act established national uniform labeling requirements for covered batteries and made the Universal Waste Rule effective in all fifty states for the collection, storage, and transportation of covered batteries. Thus, passage of the Federal law made it easier to transport batteries to the metal reclamation facility in Pennsylvania used by the RBRC.

While the passage of the Federal Battery Act provided more certainty, challenges still remain. The Federal Battery Act applies to manufacturers and retailers, and does not ban the disposal of batteries by consumers. Enforcement of existing state laws banning battery disposal for both businesses and consumers is difficult. Due to batteries' small size, it is easy for users to throw a battery away in the trash, thus, it is difficult to prevent batteries from entering the collective municipal solid waste stream and difficult to estimate the amount of batteries reaching landfills or incinerators. Educating the public is its greatest challenge.

Also, some manufacturers decided to opt out of the RBRC program in favor of individual recycling programs. RBRC contends that many self-regulating recycling programs were inconvenient to customers and ineffective.

Free riders remain a problem, particularly as new products using rechargeable batteries enter the market. Another difficulty is obtaining cooperation from foreign manufacturers. While many foreign companies, such as three of RBRC's original founders, participate in the RBRC, many do not. Internet battery sales are also a challenge to RBRC programs. Currently, Internet sales are not regulated by Federal law and a consumer can order from the Internet any battery they choose, regardless of the environmental implications.

## **U.S. and Canadian Tire Recycling Programs**

Tire recycling programs are funded by dealership end-of-life fees imposed on consumers to comply with state tire disposal regulations, and in 33 states a government managed state fee is imposed on consumers to abate old tire landfills. There is no national, industry, or consistent state legislation mandating tire recycling.<sup>268</sup>

At the end of 2001, the United States generated approximately 281 million scrap tires.<sup>269</sup> Approximately seventy eight percent of all tires produced were recycled or returned to market as follows:

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<sup>268</sup> Rubber Manufacturers Association, [www.rma.org](http://www.rma.org), November 2004.

<sup>269</sup> EPA, <http://www.epa.gov/epaoswer/non-hw/muncpl/tires/basic.htm>.

- 115 million (40.9 percent) are used as fuel
- 40 million (14.2 percent) are recycled or used in civil engineering projects
- 34 million (12.1 percent) are converted into ground rubber and recycled into products
- 15 million (5.3 percent) are exported
- 8 million (2.8 percent) are recycled into cut/stamped/punched products
- 7 million (2.5 percent) are used in agricultural and miscellaneous uses

From 1990 through 2002, the total number of scrap tires going to market increased from 11 million (24.5 percent) of the 223 million generated to 218 million (77.6 percent) of the 281 million generated as a result of fees collected by tire dealerships to fund state imposed disposal programs. This increase can also be attributed to state fees and initiatives undertaken by the economics of recycling scrap tires into a number of productive and environmentally safe applications. The remaining scrap tires are land filled. Assuming 218 million, or 77.6 percent, of the 281 million tires generated annually:

About 25 million scrap tires (10 percent) are estimated to be disposed of in municipal landfills or monofills (landfills solely for tires).<sup>270</sup> Scrap tires are also exported and, according to Mexico's National Association of Tire Distributors, as many as 20 percent of tires sold in Mexico are imported as used tires from the United States and then retreaded for reuse. To-date, there is an estimated 275 million scrap tires still in landfills; down from nearly 1 billion tires since 1990.<sup>271</sup>

In the United States there is no Federal legislation for scrap tire disposal, as tires are considered solid waste and governed by state environmental regulations, nor are there uniform industry or state scrap tire management programs. All scrap tire management programs are individually managed at the state level and paid for by consumer fees to the state and/or dealership. Generally, all programs include: funding via taxes or fees on tires; market development activities; licensing or registration requirements for scrap tire haulers, processors, and some end users; manifests for scrap tire shipments; requirements regarding who may handle scrap tires; financial assurance requirements for scrap tire handlers, storage facilities, and disposers; and tire pile clean-up.

In all states first sellers or dealerships are obligated by the state to adhere to tire disposal consistent with state environmental regulations and each states regulation may differ. This cost is passed on to the consumer by the dealership as an EOL disposal cost, that ranges from USD \$1.00 to USD \$2.50 per tire and is used to pay for the removal of the used tires as well as the final disposal that the customer wants the dealer to handle. The dealer then pays a tire hauling company a fee to take the tires to a processing plant. The tire hauler then pays the processing plant to shred the tires. The disposal fee charged by dealers is not regulated and

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<sup>270</sup> Rubber Manufacturers Association, November 2004.

<sup>271</sup> Scrap Tire Management Council,  
[http://www.rma.org/scrap\\_tires/scrap\\_tire\\_markets/tire\\_disposal\\_study\\_exec\\_summary.pdf](http://www.rma.org/scrap_tires/scrap_tire_markets/tire_disposal_study_exec_summary.pdf), (November 2004).

dealers are free to charge any amount. Most dealers' disposal fees are utilized for disposal and not simply as a way for increasing store profits. Of course, the customer could simply request to keep the old tires and not have to pay the disposal fee. The customer may be able to dispose of these old tires through the periodic miscellaneous solid/hazardous waste collection days that each city undertakes. In the case of Virginia, tires must be shred and the states 10 tire processing plants charge approximately USD \$0.60 to shred each tire. In 33 other states there is a separate fee of USD \$0.50 to USD \$1.00 charged to the consumer by the state to fund tire landfill abatement operations or pay for other state programs such as municipal transportation. The consumer pays this tax when they buy new tires. The remaining states either do not have a tire landfill abatement program or use general fund allocation (retail tax, municipal tax) money to pay for any tire landfill abatement.

In some states, like Virginia, a portion of that money is used as a subsidy to end users who utilize the scrap and shredded rubber for recycling, civil engineering, or tire-derived fuel. In Virginia, as a result of the state provided end-user reimbursement, the state can track almost all of the used tires and haulers. Virginia generates approximately 7 million used tires annually that are processed at 10 facilities. No tires are land filled making it a very successful program.<sup>272</sup> In some states, none of the money is used for tire management programs.

There is no Canada-wide regulation mandating scrap tire recovery/recycling. That responsibility is left to the Provinces and Territories on a voluntary basis. So far, nine Provinces and one Territorial Government operate centrally coordinated scrap tire recycling programs. Financial support for each of these systems is based on a levy, or environmental fee, charged on new tire purchases in the jurisdiction concerned. Levies across the country for passenger tires presently range from CDN \$2.00 to \$5.00, while sales of larger truck tires may involve a higher fee, based on rim size. Provinces utilize the multi-stakeholder 'Stewardship Boards' that are represented by industry and other non-governmental stakeholders to carry the central program responsibility. For instance, in Saskatchewan, which uses stewardship model, industry and the consumer derive benefit and utility from the sale and the use of the product. They have the responsibility to fund the recycling or proper disposal of the product at the end of its useful life. There is a Tire Recycling Fee (TRF), often called an environmental handling charge, that is collected by the first seller and remitted directly to the industry-sponsored, not-for-profit, non-governmental agency responsible for the day-to-day operation of the product management program. None of the TRF enters the Government's general revenue stream. The TRF is not a tax imposed by the government, it is the disposal fee assessed and implemented by the tire retail industry and other stakeholders. As such, all money collected goes towards the recycling of the tire. Saskatchewan has over an 80 percent recycle rate of the annual sale of tires.

In Saskatchewan, there are two crumbing plants and four processing facilities that make products out of recycled tires, such as astro-turf for athletic stadiums and playground crumb turf (an alternative for sand in play structures). There are molded products such as mats, shingles, car ramps and patio bricks. One facility makes bobcat tires out of stamped pieces of

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<sup>272</sup> Virginia Department of Environmental Quality, December 2005.

side walls of agricultural tires and one facility makes safety mats and clothing (belts) and swings. Overall, less than 15 percent of the scrap tires collected through Canada's existing programs is now shipped for burning as Tire-Derived Fuel.

### **U.S. Carpet Recovery Program**

*(Producer responsibility with CI or PCI)*

According to industry, approximately 4.7 billion pounds of carpet was discarded in 2002, of which 96 percent ended up in U.S. municipal landfills - accounting for 2 percent of landfill volume. Less than 4 percent were recycled. The bulky nature of carpets, variety of materials, and the economics of collection, handling and recycling are cited as common deterrents to recycling.

In January 2002, carpet and fiber manufactures, state governments, the EPA, and non-governmental organizations signed a voluntary Memorandum of Understanding (MOU) for Carpet Stewardship known as the National Carpet Recycling Agreement.<sup>273</sup> This agreement established a 10-year target to divert 40 percent of discarded carpet from landfills by 2012. The agreement asks manufactures to take primary financial responsibility for achieving these diversion rates. The carpet industry created a third-party organization called the Carpet America Recovery Effort (CARE) to monitor, evaluate and assess progress toward the negotiated outcome goals. The agreement is a voluntary agreement of product stewardship to include collection infrastructure, recycling opportunities, program assessment and national funding.

At this time, CARE is based on voluntary industry contributions. In addition to annual reports, CARE will provide a progress report toward meeting the year three management goal in 2005. In 2007 CARE will commission a study to evaluate progress and barriers to achieving the negotiated outcomes, by 2010 create a multi-stakeholder processes for developing recommendations and goals for the next 10 years, and by 2012 issue a final report.

Nylon 6 and 6,6 account for almost 60 percent of all carpet face fibers with polypropylene (olefin) and polyester making up most of the rest. The face fiber is the most valuable part of the carpet for recycling, but it must be identified and separated based on face fiber type. Polyester and olefin are not economical to recycle, in part because the virgin materials are so cheap.<sup>274</sup> Carpet backing is predominately latex and polyvinylchloride (PVC). PVC backed carpets are easier to recycle today but are also more expensive and are used primarily in commercial settings. Most residential carpet is latex backed. Carpet weighs approximately 4-5 pounds per square yard and costs US \$0.05-0.25 a pound to recycle.<sup>275</sup> Recycling is low due to the high cost of collection, transportation, and the cost of the technology. In addition,

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<sup>273</sup> Memorandum of Understanding for Carpet Stewardship can be found at <http://carpetrecovery.org/about/mou.asp>.

<sup>274</sup> Fishbein, Bette K., *Carpet Take-Back: EPR American Style*, Environmental Quality Management, pp. 25-36, Volume 10, No. 1, Autumn 2000, reprinted by INFORM, Inc., [www.informinc.org/carpettakeback.php](http://www.informinc.org/carpettakeback.php).

<sup>275</sup> CARE, [carpetrecovery.org/about/FAQs.asp](http://carpetrecovery.org/about/FAQs.asp), (November 8, 2004).

industry has not found products that can cost effectively be produced for the combined costs of collection, sorting, and de-polymerizing used carpets at a time when landfill rates range between US \$0.03-0.06 a pound depending on location.

Companies such as Collins & Aikman, Honeywell, BASF, Dupont, Interface, and Solutia (Monsanto) have recycling efforts. Collins & Aikman's is profitable. A couple of high profile centers have filed for bankruptcy. In 1999, Evergreen Nylon Recycling, a joint venture between Honeywell and Dutch State Mines, invested US \$120 million to design and construct a plant in Georgia to de-polymerize and reuse 200 million pounds of used nylon in their new carpets. They believed this would save 700,000 barrels of oil and reduce greenhouse emissions by 67 percent. It was envisioned that by 2002 they would have 150 suppliers in 120 metropolitan areas up from 40 suppliers in 33 metropolitan areas in 1998. However, many of the suppliers, according to CARE, were small, ad-hoc collection systems that did not result in substantial quantities of used carpets consistently coming to the center. The center shut down in late 2001. In 2000, the German company, BASF, spent US \$200 million dollars to build an integrated center where Nylon 6 and Nylon 6.6 were de-polymerized to be reused. However, citing similar high costs of collection and transport and lack of cost efficient end use of their products, the center filed for bankruptcy in 2003. Dupont, the largest U.S. carpet manufacturer initiated the Carpet Reclamation Program in 1991 for its dealers, mills, designers, and end users. The 80 Dupont dealers collect old carpet at time of new installation and pay a fee, which is passed onto the consumer, based on land-filling costs to keep the recycling program running. On average, the 80 U.S. dealers collect 10,000 tons of carpet per year. The material is stock piled or sold to bulk dealers who recycle it into palletized resins for use in the automotive industry, use as in flooring tiles, or made into fiber in padding and sports turf or as a coal substitute.

Demand for products made with recycled content carpet is beginning to develop. Carpet manufacturers are recycling old carpets into the structured backing of new modular and new performance broadloom carpets. For that reason, EPA issued a Notice of Data Availability in the Federal Register regarding the proposed addition of nylon carpet to the Comprehensive Procurement Guidelines (CPG) based on information that carpet manufacturers provided.<sup>276</sup> Market solutions, however, are still in their infancy.

According to CARE, the hierarchy for used carpets ranges from land-filling at the bottom to de-polymerizing and reusing the monomers as raw ingredients for new carpets at the top of the hierarchy. At this time, many in the industry believe the most effective use of old carpets is as an energy source. Carpets have similar BTU ranges as coal, has no mercury effluent as does coal, emits a narrower range of contaminants than coal, and because carpets contain calcium carbonate, this can be recovered for use in the cement industry. There is, however, a greater release of greenhouse gases when carpets are incinerated for energy recovery. EPA, while recognizing a place for energy recovery from carpets, wants to work toward diversion strategies enumerated in the MOU such as reuse and recycling. According to CARE, there are proprietary studies and innovations under way by industry leaders and a few

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<sup>276</sup> See <http://www.epa.gov/epaoswer/non-hw/procure/pdf/rman4noda.pdf>.



entrepreneurs to find new uses for used carpet. The largest use of recycled carpet at this time is in the manufacturing of carpet cushions and for the automotive parts plastic molding industry.

While CARE has not met its interim goals to date, the carpet industry believes that it is on track to meet its overall goal of 40% diversion from landfills by 2012. That goal, according to the industry, will not necessarily be achieved through a linear ramp-up due to the momentum of market forces. Government MOU signatories are concerned that more needs to be done if the industry is to meet its expectations in ramping up reuse and recycling by 2012. CARE does not support a mandate for recycling because the important ingredient to a successful program is still not in place, i.e. a post end-use product made from recycled carpets. Instead, CARE offered that mandates for products with re-cycled carpets would drive efficiency in collection and recovery.

CARE faces the following challenges to meet the outcomes of the Carpet Stewardship MOU: carpet costs between US \$0.02-0.19 more per pound to recycle than to send to a landfill; there is no current demand for products made from recycled carpet given present costs; there is no infrastructure in place for collection and no financial incentive to collect; collection and transportation costs to recycling centers are very high given the bulky nature of carpet; and market forces cannot remedy these barriers without financial incentives. As long as landfilling is cheaper than recycling, most consumers and carpet manufactures may opt to landfill. Market forces alone are not going to incent recycling.

### **Alberta Beverage Container Recycling Program<sup>277</sup>**

*(Industry-managed deposits/refund plus ARF)*

The Alberta Beverage Container Recycling Program is an example of a deposit/return system with an advanced recycling fee (ARF), regulated by the government and administered by the industry under provincial regulation. It has an 80 percent recovery rate. Beverage containers are high volume, easily separated with low disposal cost and have a high reusability life span. Since 1992, the industry has voluntarily standardized beer bottles across Canada allowing interchangeability among brewers to the level of 90 percent. Each province has different regulations and infrastructure that affect stewardship, but consumers across Canada pay a bottle deposit.

Alberta's program began in 1972. It is regulated under the Environment Protection and Enhancement Act and the Alberta Regulation 101/97 or Beverage Container Recycling Regulation. It includes any ready-to-drink beverage, but not milk containers or unsealed plastic or paper cups. The object is to collect and recycle beverage containers that have been sold and distributed within the province. While there are no mandated recovery rates for containers, Albertans return almost 80 percent of all containers as a result of the deposit system. The funding for the program comes from revenues selling promotional material and from unredeemed refunds.

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<sup>277</sup> More information on this is available at [www.abcrc.com](http://www.abcrc.com).

The Beverage Container Management Board (BCMB), made up of industry and provincial government representatives, administers the program through industry. The Alberta Beverage Container Recycling Corporation for non-beer products and the Alberta Beer Container Corporation for beer products are the two "Collection System Agents" (CSA) responsible for ensuring containers are collected, transported, processed, and recycled on behalf of their producers or brand-owners, and then reporting sales data to the BCMB. The collected containers are returned to such organizations as Alcan for the aluminum, Merlin Plastics for the plastic type materials, etc. During 2001, the average recovery rate by material excluding milk products and beer containers was 74.5 percent: 81 percent for aluminum cans, 70 percent for plastic and 76 percent for glass. Including beer, the overall recovery rate for all containers was approximately 80 percent, (88.1 percent for aluminum and 94.9 percent for glass).

In Alberta, retailers collect deposits from the consumer, which range from CDN \$0.05 to 0.20 depending on container size, and the consumer receives a refund for the full amount when he returns the container. Since September 15, 2002, the consumer also pays a "Container Recycling Fee" (CRF), which is not refunded. The value of the CRF varies from CDN \$0.01 for an aluminum can to CDN \$0.08 for a glass container greater than 1 litre in size. The CRF is essentially the cost of recycling the particular container above and beyond the salvage value.

In essence, the manufacturers, at the time of sale of the product, pay the CSA the deposit amount as well as the CRF. Out of this amount, the CSA reimburses the collection depots a "handling fee" for the container which varies from CDN \$0.028 for an aluminum soft drink container to CDN \$0.08 based on ease of handling, square footage taken up in the depot, volume of containers, etc. Unredeemed refunds, which are refunds not paid back to the consumer because containers are not returned, goes into advertising the promotion of container returns. Depot operators pay a fee (CND \$0.00045) per unit recovered to the BCMB for each unit covered to oversee the program. For British Columbia and Saskatchewan it is quite similar. Alberta and British Columbia are industry models whereas Saskatchewan is run by the government utilizing the depot system to help handicapped people.

Manitoba and Ontario have "blue box" (household recycling box for glass, papers, plastics, etc.) programs should a consumer not want to return his containers for a refund. Quebec has a return to retail program. New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland have "half back programs" through their depot systems where the consumer gets half of their money back. The Northwest Territories is just starting a program similar to that of Alberta.

## **Alberta Used Oil Recovery Recycling Management Program<sup>278</sup>**

*(Industry-managed deposit/refund fee to first sellers, not to consumer)*

In the 1980's, the Canadian Minister of Environment in conjunction with the Canadian Petroleum Products Institute and stakeholders in the provinces of Alberta, Saskatchewan and Manitoba worked with oil producers to discern how to collect used oil. Together, they created the Alberta Used Oil Recycling Program. It initially started as a three year pilot program between the parties to recover used oil containers, oil filters and used oil to provide the recycling industry with raw materials to be recycled into usable oils, lubes, plastics, and steel. It evolved into law in 1997 with two laws: Lubricating Oil Material Recycling and Management Regulation Act and the Lubricating Oil Material Recycling and Management By-law Regulation. Under this program, an Environmental Handling Charge (EHC) is charged to the first sellers of oil and filters to refund the recovery process for the collectors of the three waste materials. The EHC can be absorbed by the first seller, but is typically passed to the consumer at the point of purchase.

First sellers<sup>279</sup> must be members of the Alberta Used Oil Management Association (AUOM). The AUOM is responsible for developing the program to collect and manage used oil, oil containers, and oil filters from consumers. It is also responsible for recording and measuring the amount of used oil filters and containers and reporting that to the Ministry of Environment.

First sellers remit the total EHC to the AUOM, who in turn, pays return incentive fees to the collectors from the private sector. The first seller has no requirement to absorb the cost and many pass the cost to the distributor, retailer and finally the consumer via inclusion in the product price or a separate line item. Consumers do not recoup the EHC from disposal centers. Return incentives range from CDN \$0.08-0.17 per liter of oil collected, CDN \$0.68 - \$1.19 per kg of filters collected and CDN \$0.87 to \$1.10 per kg of plastic containers. The EHC for oil is CDN \$0.05 per liter of oil, CDN \$0.05 per 1 liter container and CDN \$0.50 to \$1.00 per filter.

During 2000-2001, the Alberta Used Oil Management received approximately CDN \$12.3 million dollars and recovered 67 percent of used oil, 78 percent of used oil filters and 38 percent of plastic oil containers. This program receives no public funding. The used oil collected supports Canada's two refining businesses and has created new recycling opportunities for plastic recycling companies. As a result of this program, less oil, oil containers, and filters are being disposed of in municipal landfills, thus reducing the cost to the taxpayer.

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<sup>278</sup> Alberta Used Oil Recycling Management Program, <http://www.usedoilrecycling.com/index.cfm>, (November 4, 2004).

<sup>279</sup> First sellers can be manufacturer, marketer, wholesaler, retail distributor or importer.

## **Paint Stewardship Program in British Columbia: Product Care<sup>280</sup>** *(Industry-managed ARF or PCI)*

Product Care is an example of an industry response to product stewardship regulations, or extended producer responsibility regulations, enacted in British Columbia, Canada in 1994 following regulatory mandate of the Waste Management Act. Under these regulations “brand owners”<sup>281</sup> of the regulated products must provide a way for consumers to dispose of their leftover paints, varnishes, stains, and aerosols for home and commercial use, and then was extended to include the disposal of flammable liquids, pesticide, and gasoline in an environmentally responsible manner. Thematically, the manufacturers are responsible for developing the collection, disposal, and financing systems for collection and re-use. They can either internalize the cost or charge an ARF. Product Care is a non-profit association, sponsored by the industry and represents 60 brand owners, acting as a third party organization (TPO) to manage and finance the program. It partners with local governments, private industry, and nonprofit groups to operate over 104 collection depots for consumers and pays for the management of the disposed products.

The program is funded by an “eco-fee” paid by the consumer at the point of purchase. However, the manufacturer has the choice to absorb the eco-fee into the price of the product or show the eco-fee separately to the consumer. The eco-fee is collected at the point of purchase along with provincial and national taxes, but it is remitted to Product Care and not to the government. The eco-fee is considered to be part of the price of the product and therefore is taxed along with the rest of the product price. For paints, eco-fees range from CDN \$0.10 for containers of 250 ml or less to CDN \$1.00 for containers of 5.0-23 liters. Eco-fees rates vary depending on products. There is no drop-off charge to consumers at the depots. Collectors may be compensated by Product Care for providing collection services at a rate negotiated by both parties. Product Care funds the transportation and product disposal.

Product Care evolved through a series of amalgamations. The process began in 1994 when British Columbia (BC) Paint Care Association was formed to manage leftover consumer paint in response to BC's Post-Consumer Paint Stewardship Program Regulation. After a similar Post-Consumer Residual Stewardship Program Regulation was enacted in 1997, two other stewardship associations were formed to manage flammable liquids, pesticides, and gasoline. BC Solvent Care Association (SCA) managed paint-related solvents, and the Consumer Product Care Association (CP Care) managed pesticides, gasoline, and the solvent from non-paint brand owners. By 2001, these associations had merged into Product Care, which is now responsible for the environmental stewardship of consumer paint, flammable liquids, pesticides, and gasoline in British Columbia.

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<sup>280</sup> Product Care, <http://www.productcare.org/index.html> and Northwest Product Stewardship Council Policymakers' Bulletin, Volume 3, Issue 2, September 2004.

<sup>281</sup> Brandowner is defined as the producer or distributor and include the responsibility to collect eco-fees from retailers, develop educational materials, and ensure collection and management of used paint from consumer through collections sites.

In 2000, Product Care reported 4,000,000 liter containers collected: 78 percent were recycled as raw material in the production of new industrial goods as roofing material, concrete products, and caulking, and 11 percent was re-used as free product to non-profit groups. Additionally, 437 tons of scrap steel and 30 tons of scrap plastic were recycled. Approximately 3 percent of paint was incinerated and 8 percent used as energy recovery in cement kilns. Since its inception in 1994, there has been an increase in the recycling and re-use of paint materials every year. In addition, consumers, through the educational materials of Product Care, are becoming more knowledgeable of how to buy and use paint more efficiently to eliminate waste. Each year, Product Care must provide the Ministry of Water, Land and Air an annual report on behalf of the brandowner to include the amount of paint sold and recovered; educational efforts; processes to treat, recover or reuse paint, and financial statements.

### **Quebec Used Paint Program: Eco-Peinture**

*(Industry-managed ARF, government set recovery targets)*

In 1997, members of the Quebec Paint Industry of brand-owners<sup>282</sup> and/or first-importers voluntarily formed Eco-Peinture, a program to undertake the responsibility of ensuring the recovery of post consumer paint and containers. In 2000, Quebec Regulation 655-2000, “Regulation Respecting the Recovery and Reclamation of Discarded Paint Containers and Paints” under the Quebec Environment Quality Act was passed. This Act covers paints sold in retail outlets to include stains, primers, varnishes, lacquers wood or masonry treatment products and other mixtures designed for maintenance, protection or decoration. It does not cover paints used by artists. It set recovery targets of 25 percent by 2002; 50 percent by 2005; and 75 percent by 2008. The recovery rate, or amount estimated to be available for recycling and reuse is estimated to be 7 percent of the total volume of paint sold.

Industry then asked that the Province regulate its program of paint collection and recycling program through a Memorandum of Understanding in an effort to have provincial oversight through one industry focal point, Eco-Peinture<sup>283</sup>. As a result, Eco-Peinture provides on a yearly basis to the Provincial Government an annual report that includes the amount of paints and containers recovered, reclaimed, and eliminated as compared to the yearly sale of all paint containers by the brand-owners or first-importers.

Utilizing “polluter-pays” concept, the program run by industry is funded by a mandated flat fee paid by the consumer of CDN \$0.25 for any container sold in Quebec, which pays for the whole program from retailers, transportation, to processing plants. Brand-owners or first importers join the membership rolls of Eco-Peinture, which acts a third part organization to take on the responsibility for recovery of post-consumer paint and containers, informing the collection points, informing the public, and finding ways to reclaim the paint through reusing or recycling. Since the program does not pay for pick-up of paints, consumers can either

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<sup>282</sup> Brand owner is defined as the producer or distributor and include the responsibility to collect eco-fees from first importers, develop educational materials, and ensure collection and management of used paint from consumer through collections sites.

<sup>283</sup> See [www.ecopeinture.ca](http://www.ecopeinture.ca), (November 22, 2004).

bring the paint back to the retailers, which is then picked up through Eco-Peinture infrastructure, or the municipality pays for and utilizes its own household hazardous waste collection infrastructure, which includes paints, from neighborhoods and the transportation to the processing plant. About 30 percent of the paint and containers are collected by retailers and 70 percent by the municipality.

Between April and September of 2001, the program recovered 1.7 million kilograms (3.74 million pounds) of paint and containers. Approximately 64 percent of the material went back to the paint industry to be recycled or reused. Approximately 20 percent of the total weight represented the containers, which was recycled. Approximately 16 percent of the material was unusable and sent to the landfill. Peintures Récupérées du Québec (the re-processing plant) is a subsidiary of Société Laurentide, a paint manufacturer located in Shawinigan. The re-processed paint is then put back on the market and marketed as recycled paint under the name of "Boomerang". The metal and the plastic from the old cans are sold on the recycled steel or plastic markets by Peintures Récupérées. According to Eco-Peinture, Quebec has met its target for 2002 and will meet the 50 percent target, at least for paint in 2005.

### **European Union's End-of-Life Vehicles Directive**

*(Producer responsibility with government set targets)*

The number of cars scrapped in the EU is expected to surpass 17 million by 2015. Approximately 75 percent of the weight of a car is made up of steel and aluminum, but it also contains a wide variety of other metal materials such as, lead, mercury, cadmium and hexavalent chromium. In addition, a car has other substances such as liquids, plastics, anti-freeze, brake fluid and oils that, if not properly managed, may cause significant environmental pollution. Many of these are recoverable and recyclable.

As a result of this growing number of scrapped cars and the differing disposal methods by Member States of cars, the EU was striving for harmonization. The EU introduced a Directive on end-of-life vehicles (2000/53/EC), which had an implementation date of April 2002, and aims to improve recovery, reuse, and recycling of cars, to minimize the final disposal of the increasing number of scrapped cars.

The EU approach to the ELV<sup>284</sup> Directive 2000/53/EC is avoiding waste by improving design and increasing the recycling and reuse of waste, by obligating vehicle manufactures and equipment manufacturers to produce vehicles that can be easily dismantled and increasing use of recycled parts. It also seeks standardizing component and material coding standards to facilitate the identification of materials for reuse and recovery, as well as curtailing the use of components that use mercury, hexavalent chromium, cadmium and lead (excepted those listed in Annex III) by July 2003. The Directive introduces provisions for the Member States to develop systems for the collection and transportation of ELVs, waste, and used parts from vehicle repair centers to authorized treatment facilities at no cost to the last owner. Producers are required to meet all or a significant part of these costs. Additionally, a system is developed whereby a Certificate of Destruction is issued to a last owner as a

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<sup>284</sup> End-of-Life Vehicle is any type of vehicle which is waste within the meaning of Directive 75/442/EEC.



condition for de-registering and ELV when it is taken to the authorized treatment facility. Member States must in accordance with European Control, Directive 75/442/EEC and Annex 1 of 2000/53/EC ensures that that treatment facility for recycling, recovery/reuse, and storage for the handling of recoverable parts are met. Progressive targets for total recovery have been set at 85 percent by average weight by 2006 and 95 percent average weight by 2015.

## **APPENDIX VII**

### **E-WASTE ACRONYMS**

ADF	advance disposal (recycling) fee
ARF	advance recovery fee
BOE	California Board of Equalization
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	conditionally exempt small quantity generators
CI	cost internalization
CIP or COI	collection incentive payment
CIWMB	California Integrated Waste Management Board
CPU	central processing unit of a computer
CRT	cathode ray tube found in televisions and computer monitors
DfE	design for environment changes
DfR	design for recycling
DTSC	California's Department of Toxic Substances Control
EOL	end of life fee
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
EPR	extended producer responsibility
ESM	environmentally sound management
EU	European Union
FEC	Federal Electronics Challenge
HSWA	Hazardous and Solid Waste Amendments
ICT	information and communications technologies
LCD	liquid crystal display
LRAs	Local Regional Authorities
NEPSI	National Electronics Product Stewardship Initiative
NVMP	Netherlands Association for Disposal of "Metaelectro" Products
OEM	original equipment manufacturer
OTP	Office of Technology Policy, U.S. Department of Commerce
PCI	partial cost internalization
READ	Recycling Electronics and Asset Disposition
RBRC	Rechargeable Battery Recycling Corporation
RCRA	Resource Conservation and Recovery Act
RoHS	European Union's Restriction of Hazardous Substances Directive
SWICO	Swiss Association for Information, Communications and Organization Technology
TCLP	Toxicity Characteristic Leaching Procedure
TPO	third party organization
WEEE	European Union's Waste Electrical and Electronic Equipment Directive